The INDUSTRIAL-ARTS MAGAZINE

MAY, 1923

THE·BRUCE·PUBLISHING·COMPANY
MILWAUKEE — WISCONSIN

ATKINS
SILVER STEEL SAWS

SAW SATISFACTION

Satisfaction is the sensation that follows the gratification of desire. It is the fulfillment of expectation and promise. While satisfaction comes last, it is the first in performance. It is worth the price. Manual Training teachers and supervisors seek it constantly in their Saws and Saw Tools and always find it when using those made by ATKINS.

There is no substitute for the satisfaction one finds in using Atkins Saws and other products exclusively. They always make good.

Let us figure on your requirements for Saws, Saw Tools, Saw Specialties, Machine Knives, Grinding Wheels, etc. Send for educational literature, Saw Sense, How To Care For And Use Cross Cut And Hand Saws, and Saw Fitting For Best Results.

A Better Saw For Every Use

ATKINS SILVER STEEL SAW No. 51
Old Style Handle, Skew Back
ATKINS SILVER STEEL SAW No. 53
Perfection Handle, Skew Back
No. 64, STRAIGHT BACK, SILVER STEEL
Handle Old Style Model
ANOTHER POPULAR PATTERN No. 65
Straight Back, Perfection Handle

E.C. ATKINS & CO.

ESTABLISHED 1857 THE SILVER STEEL SAW PEOPLE

Home Office and Factory, INDIANAPOLIS, INDIANA

Canadian Factory, Hamilton Ontario

Machine Knife Factory, Lancaster N.Y.

Branches Carrying Complete Stocks In The Following Cities:

Atlanta	New Orleans	Seattle
Memphis	New York City	Paris, France
Chicago	Portland, Ore.	Sydney, N. S. W.
Minneapolis	San Francisco	Vancouver, B.C.

Johnson's Artistic Wood Finishes are very easy to use. Boys in the Fifth and Sixth Grades can use them successfully. Simple instructions are printed on every label. Whenever specific information is desired — do not hesitate to write us. Our Individual Advice Department will gladly help solve your wood finishing problems.

The
PROPER TREATMENT
for
FLOORS, WOODWORK
and
FURNITURE

Johnson's Wood Dye is manufactured in fourteen shades and Johnson's Paste Wood Filler in five shades. All shades of Wood Dye may be easily lightened or darkened. Complete instructions are given on every label. By lightening, darkening and intermixing, hundreds of different shades are easily obtainable.

FREE - Book on Wood Finishing

THE finishing of manual training models is assuming more and more importance every year. Surely it is a subject which should be given its share of attention, for a beautiful model may be ruined if improperly finished, whereas the defects of a poorly constructed model are minimized if well finished.

Our Book on Wood Finishing is a valuable text book and should be in the hands of every Wood Finishing Instructor. It is full of information on finishing all wood—soft and hard. It is the work of experts—profusely illustrated in color.

Johnson's Artistic Wood Finishes are economical because they always give satisfaction. The cost of finishing material for an article of furniture is such a small percentage of the entire cost, that the best finish obtainable is none too good. Reliable, high quality wood finishes such as Johnson's are always more satisfactory.

With Johnson's Wood Dye it is both possible and practical to finish up complete turned articles such as lamp stands, candle sticks, etc., while they are still in the lathe. Johnson's Wood Dye penetrates Deeply — brings out the beauty of the grain without raising it in the slightest—dries in four hours and does not rub off or smudge.

JOHNSON'S *Artistic* WOOD FINISHES

Johnson's Artistic Wood Finishes are now being used in nine-tenths of the schools in the United States and Canada. They are particularly adapted for manual training work as they may be applied by the youngest and most inexperienced pupils with good results.

The finishes most popular among Manual Training Instructors and Pupils are:—Johnson's Wood Dye, Prepared Wax, Under-Lac, Paste Wood Filler, Varnishes, Perfectone Undercoat and Enamel. We have a very atractive exhibit of wood panels finished with these products which we are glad to send, free and postpaid, to Manual Training Instructors who will give it wall space in their shops.

All of Johnson's products may be quickly used—models may be finished with Johnson's Wood Dye and Prepared Wax in one period. This is particularly advantageous in crowded centers, and in grade work, where it is necessary to hold the attention of the children. It does away with the necessity of having models laying around to dry.

Johnson's Artistic Wood Finishes are being used all over the world by artisans and amateurs. Architects and contractors specify Johnson's line for coloring woodwork and flooring in new buildings. Painters and decorators use Johnson's Wood Finishes with equal satisfaction on new and old work. Upholsterers, furniture repairers and cabinet makers find it "just the thing" for their use.

S. C. JOHNSON & SON, Dept. I.A. 5, Racine, Wis.,
"The Wood Finishing Authorities"

Please send me free and postpaid your authoritative book on Artistic Wood Finishing as applied to manual training work.

We buy stains and varnishes from.....

My Name.....

My Address.....

City and State.....

Ratchet Screw-Drivers. Blades From 1 ½ inches to 10 inches in length. Prices from 90c to $1.50

Mr. Punch says:

"Students like to use the same tools that skilled carpenters and mechanics use — and I don't blame them."

Students like to use these screw-drivers

PERHAPS because these screw-drivers make such easy work of driving screws—in hard wood as well as soft wood.

The ratchet mechanism appeals to students, too. It's convenient and saves time. By a turn of the ferrule, the blade can be made to turn only to the right or only to the left while the handle revolves freely. Blades can also be held rigid.

These are the kind of tools good workmen use —tools that have made a reputation for strength, durability and convenience.

Other tools for your School

Because good workmen know and use Goodell-Pratt tools, industrial schools find it advisable to train students with such tools.

Among the 1500 Good Tools that Goodell-Pratt make are many that should be a part of your school equipment.

Write for catalog No. 15, which illustrates and describes the entire line. It's free.

GOODELL-PRATT COMPANY

Toolsmiths

Greenfield, Mass. U. S. A.

GOODELL-PRATT

1500 GOOD TOOLS

Williams' "Vulcan" Chain Pipe Vise

UNBREAKABLE, compact, rapid in action and positive in gripping pipe. Attach *anywhere*—any handy bench, post or other support will serve.

Made entirely of wrought steel, the drop-forged jaws are saw-tempered for file sharpening and the hand-made chains are of the same ***Superior*** quality as those of our well-known "Vulcan" Chain Pipe Wrenches.

Vises in 3 sizes for ⅛ to 8-inch pipe. Booklet on request.

J. H. WILLIAMS & CO.

"The Drop-Forging People"

BROOKLYN BUFFALO CHICAGO

MAYDOLE HAMMERS

THE WORLD'S STANDARD

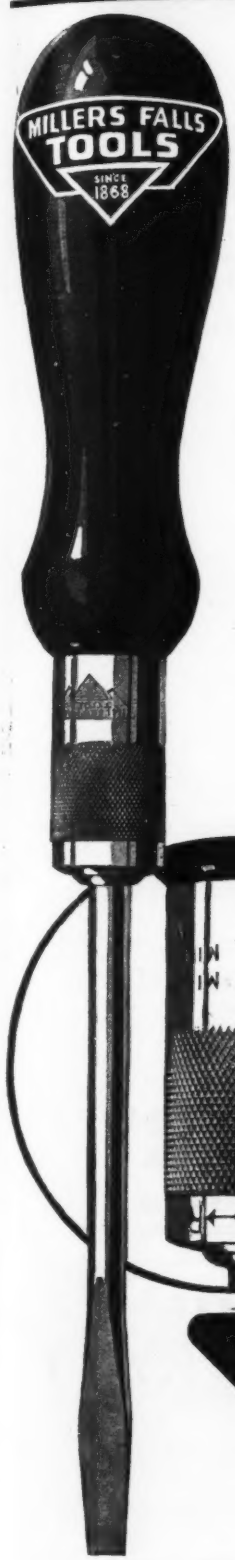
There are none better made—none better known. When you buy these hammers, you are certain of getting the best. They are used the world over.

Maydole Hammers are made of finest quality material, and guaranteed first-class in every respect.

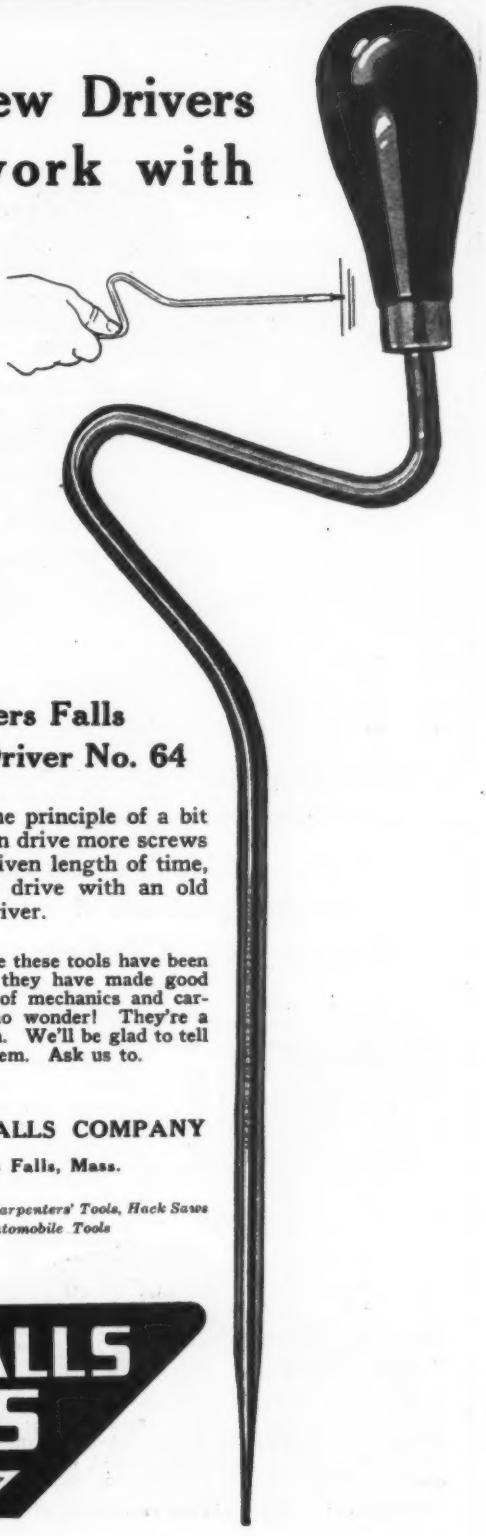
Write for our booklet of useful information, which every student should have. How many shall we send?

The David Maydole Hammer Company

NORWICH NEW YORK U. S. A.



These new Screw Drivers are a joy to work with



Millers Falls Ratchet Screw Driver No. 63

scores instantly with every mechanic who sees it and handles it. You'll like the way it looks and the way it works.

This screw driver operates on the ratchet principle. It is compact, strong, well-balanced and handsomely finished. A workmanlike tool in every respect. Try it out.

Millers Falls Screw Driver No. 64

operates on the principle of a bit brace. You can drive more screws with it, in a given length of time, than you can drive with an old style screw driver.

In the short time these tools have been on the market, they have made good with thousands of mechanics and carpenters. And no wonder! They're a joy to work with. We'll be glad to tell you all about them. Ask us to.

MILLERS FALLS COMPANY

Millers Falls, Mass.

Manufacturers of Carpenters' Tools, Hack Saws and Automobile Tools

MILLERS FALLS
TOOLS
SINCE
1868

A Timely Suggestion

At this time of the year your boys will begin to ask if they can work on such problems as a Bird House, a Plant Box, a Dog House, a Boat, etc., etc., and you must be prepared to take care of this demand for "something new." Check the following list of "BRUCE BOOKS" which offer you a wide variety of problems from which to select those that will fit in with the work you are now doing.

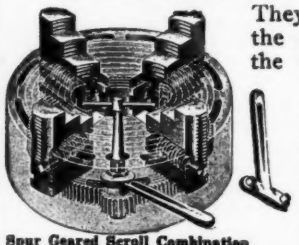
Boy Bird House Architecture—Baxter
Bird Houses, Book I—Solar
Model Boat Building—Cavileer
Elementary Concrete Construction—Baxter
Hand Craft Projects, Book I—Solar
Hand Craft Projects, Book II—Solar
Toy Craft—Baxter

COMPLETE LIST OF "BRUCE BOOKS" SENT ON REQUEST

The Bruce Publishing Company

205 Montgomery Bldg. **Milwaukee, Wisconsin**

DURABILITY — ACCURACY — STRENGTH
are striking features of
Westcott Chucks



Spur Geared Scroll Combination Lathe Chuck

They are as essential in the schoolroom as in the commercial shop. The student who learns his trade using the very best of tools and equipment, is sure to benefit in the end.

In the case of chucks—
BUY WESTCOTT

Mainly About Your Classes

Little Giant Double Grip Drill Chuck

If you are not using Westcott Chucks now, you should certainly give your boys this advantage. Their best work can only be accomplished on the best equipment. Specify Westcott Chucks on your next order—in the meantime send for our catalogue.

Manufacturers of chucks for every class of work.

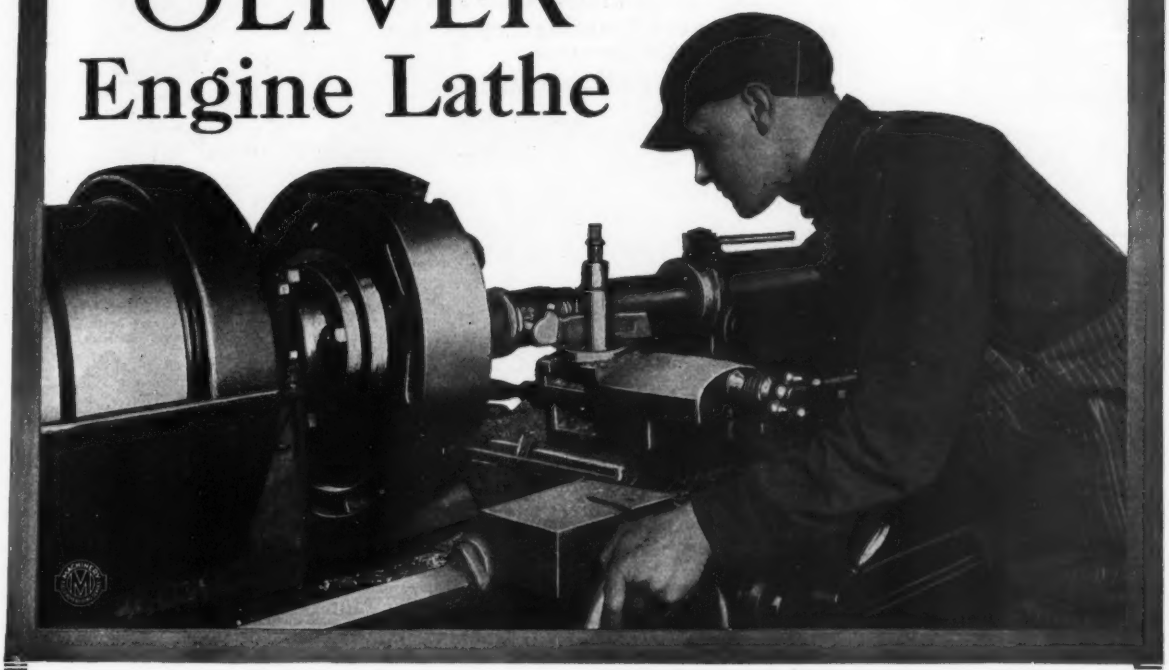
WESTCOTT CHUCK COMPANY
Oneida, **New York**

"STAR"
Hack Saws

Want the Best?
TRY IT

CLEMSON BROS., Inc.
MIDDLETOWN, N. Y.
Makers Since 1883

The "OLIVER" Engine Lathe



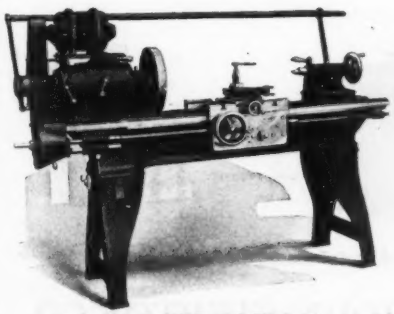
The Engine Lathe is the most used and most useful of all machine tools. The lathes that are best for the engineering plant are also best for the school. An "Oliver" 16-inch Engine Lathe is shown above finishing swivels for the Four Drive Tractor.

The universality of "Oliver" Engine Lathes and the built-in advantages recommend them to Manufacturers, Tool Rooms, Experimental Laboratories, Repair Shops, Garages, Manual Training and Technical School Shops alike.

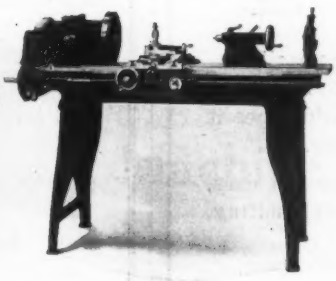
10-12-14-16-18-26-30-Inch Sizes.

OLIVER MACHINERY COMPANY,

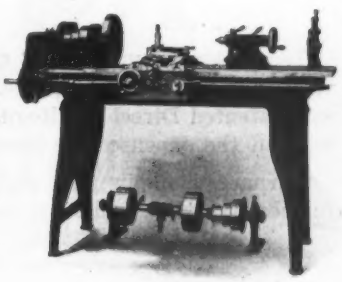
Grand Rapids, Mich., U. S. A.



14-inch All Geared Head Motor Drive.



12-inch Geared Head Single Pulley Drive.



10-inch Cone Pulley Drive Engine Lathe and Countershaft.

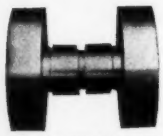
THE JOHNSON FRICTION CLUTCH

FOR SCHOOLS

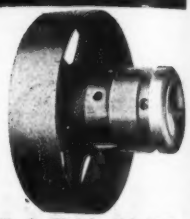
Cut the Cost of Power Transmission by Using JOHNSON CLUTCHES in Your Manual Training Department

AS ILLUSTRATED

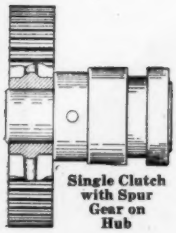
"BE SURE IT'S A JOHNSON"



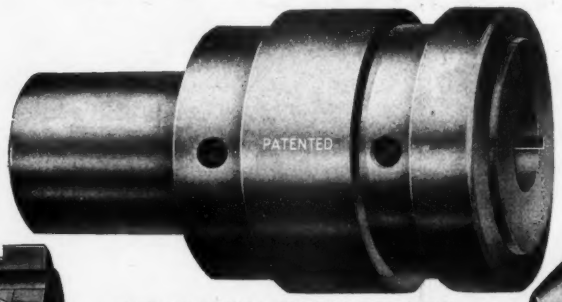
Double Clutch with Pulleys



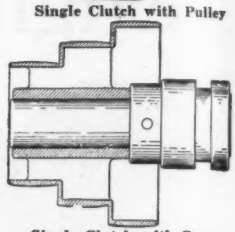
Single Clutch with Pulley



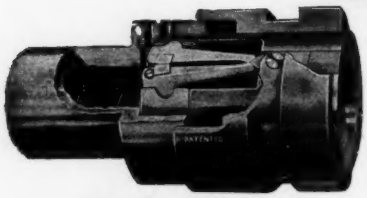
Single Clutch with Spur Gear on Hub



THE JOHNSON SINGLE CLUTCH



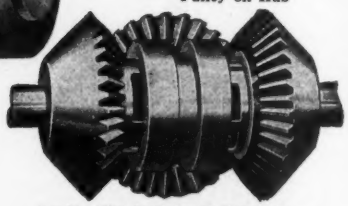
Single Clutch with Cone Pulley on Hub



Single Clutch Broken Away

MEMO FOR YOUR STENOGRAPHER

Please write the Carlyle Johnson Machine Co., Manchester, Conn., as follows:
Please send Catalog "IAM" and Clutch Information Blank of small, compact friction clutches.



Double Clutch Between Bevel Gears

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

JOHNSON GAS APPLIANCES

Require No Forced Air Blast

No. 101 Bench Furnace

Temperatures up to 1800° are easily developed in this Bench Furnace. The Johnson Patented Direct Jet Regulator does it without the expense of a blower.

Furnaces made in many styles and sizes, for heat-treating, soldering, metal melting.

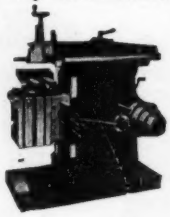
Send today for our illustrated booklet of Gas Appliances; shows temperatures, colors, etc.

JOHNSON GAS APPLIANCE CO. Cedar Rapids IOWA

SHAPERS MILLERS ENGINE LATHES

14"x6'—$400.00
16"x6'— 450.00
With Quick Change Gear Box
$85.00 extra

Moderate price machine tools — practically fool proof — ideally suited for school shops. Thousands in use all over the world giving daily satisfaction.

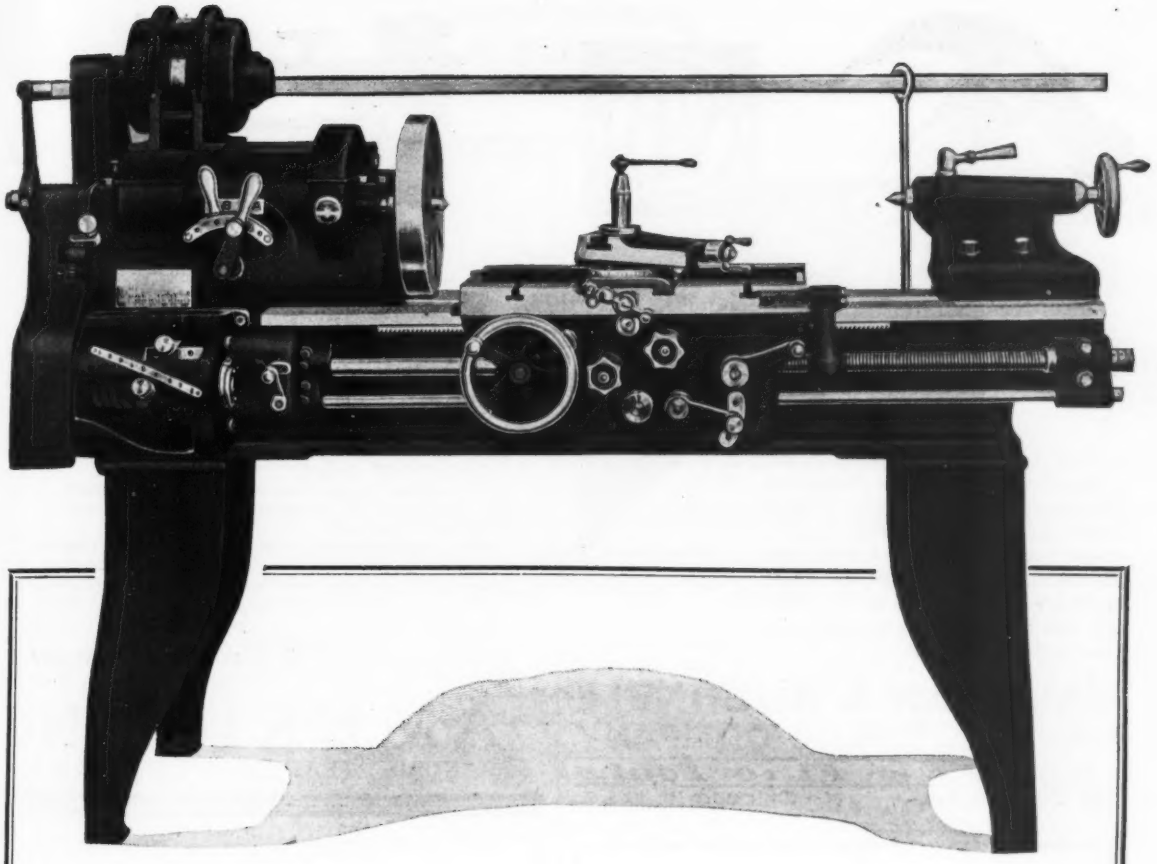


Descriptive catalogue and full particulars furnished upon request.

Industrial Education Department

THE JOHN STEPTOE CO.

CINCINNATI :: :: OHIO



14″x6′ Monarch Motor Driven Lathe. One of the very finest lathes in the world. Hundreds in use in Vocational Schools. Smaller and larger sizes of Monarch Lathes fit every school requirement. Let us submit prices.

The Monarch Machine Tool Co.

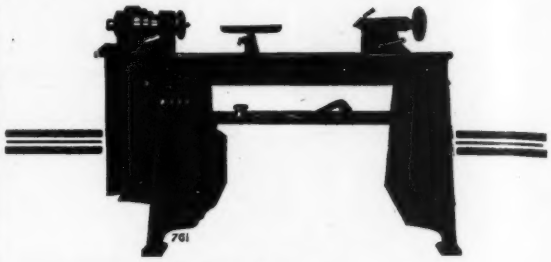
304 Oak Street **Sidney, Ohio**

V & B Supersteel Hammers are equipped with Vaughan's Expansion Wedge—positive insurance of a tight handle and head. Tool heads are drop forged from a solid bar of Vaughan's Supersteel, Ebony Finished and trade-marked V & B in etched gold. A fine tool that will appeal to the man who takes pride in his work.

VAUGHAN & BUSHNELL MANUFACTURING COMPANY

Makers of Fine Tools

2114 Carroll Ave. Chicago, Ill. U.S.A.



UNUSUAL!—

in its safety features

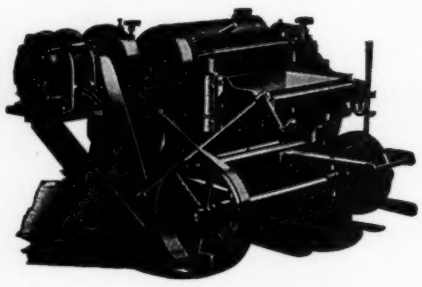
Although safety is only one of the many fine features incorporated in the "American" High Speed Ball Bearing Lathe and other "American" wood working and manual training machinery, it is the feature that appeals most to superintendents and teachers charged with responsibility for the safety of their classes.

In addition to safety—ruggedness and simplicity of control are also inherent in "American" manual training equipment.

Our catalog should be in your library. Write for it today. It lists and describes the full "American" line, which includes saw benches, jointers, planers, band saws, wood workers and other manual training machinery.

American Saw Mill Machinery Company
74 Main St. Hackettstown, N. J.

AMERICAN
MANUAL TRAINING EQUIPMENT



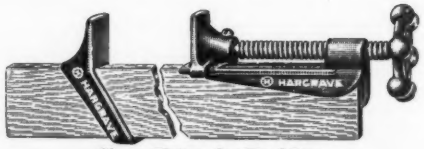
CRESCENT WOOD WORKING MACHINERY in your wood working department will give the same satisfactory service that the machines are delivering in thousands of factories throughout the world.

Send today for catalog of band saws, saw tables, jointers, borers, disk grinders, planers, planers and matchers, swing saws, cut off tables, shapers, mortisers, variety wood workers, universal wood workers.

The Crescent Machine Co.
25 Main Street
Leetonia, Ohio, U. S. A.

Standard Carriage Clamp

Perfection Steel Bar Clamp



Clamp Fixture for Wood Bar

We manufacture a complete and up-to-date line of Clamps, ranging in size from 1 in. to 10 ft. opening, also many other improved mechanics' tools which should interest you. Write for our new catalog.

Ask your dealer for HARGRAVE QUALITY TOOLS

THE CINCINNATI TOOL CO.

Established 1879
Incorporated 1884

Waverley Ave. and C. L. & N. Ry.
CINCINNATI, OHIO

HAVE YOU ENTERED OUR $10,000 CONTEST?

Tremendous Response Follows Initial Announcement

All Teachers of Cabinet Making and Directors of Vocational Education are Eligible

The large number of replies to the announcement of our $10,000 Idea Contest proves emphatically that teachers all over the country agree with us that cabinet making possesses untold possibilities for character building and also for both mental and cultural development.

If you are a teacher of cabinet making or a director of vocational education you must agree with this thought too. Then why not write us your ideas on the subject? If you win one of the first prizes you will be handsomely rewarded. If you do not win one of the cash prizes you will receive another award that will make your work well worth while.

HOW TO ENTER THE CONTEST

Write us 500 words or more, telling what you are doing or propose to do to emphasize the cultural side of cabinet making in the training of your boys. We do not care about the technical or trade side except as it may relate to the educational phase of the subject.

All essays submitted will be graded by a board of judges consisting of three men high in the vocational field. The best essays will be bound in book form and distributed broadly throughout the country. You will receive a copy of this book. Perhaps your name and essay will be in it if you try.

Other essays of 500 words and more will receive a merchandise prize,—a useful article which alone you will consider well worth the effort regardless of your chance of winning a major prize.

You will enjoy writing your ideas on the subject. They are valuable to you. They will be valuable to others. They will be valuable to us.

WRITE FOR COMPLETE DETAILS

AMERICAN WOODWORKING MACHINERY CO.

ROCHESTER, NEW YORK

PARKER VISES

Have Renewable Jaws That Cannot Work Loose

Milled to fit and ***pinned on***, not cast or screwed on. Not a mere face jaw, but one that covers the entire top of the vise with steel.

—and a Swivel that Grips Like a Grizzly

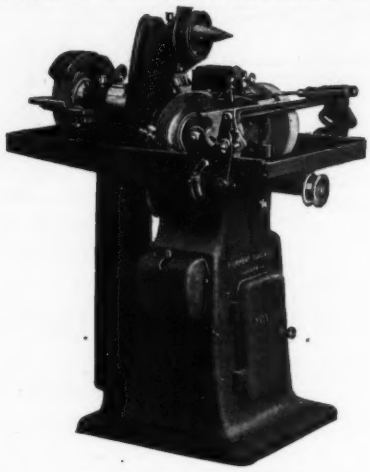
Not a mere clamping device, but a wedge and ring construction that gives a gripping power 360 degrees of the base.

Ask us about other Parker Features.

THE CHARLES PARKER COMPANY
Master Vise Makers,
Meriden, Conn., U. S. A,
Parker Vises Grip Like a Grizzly

MUMMERT-DIXON OILSTONE GRINDERS

The Modern Edge Tool Sharpening Machines
THE STANDARD FOR ALL INDUSTRIAL SCHOOLS



No. 481—Motor or Countershaft Drive.

An automatic attachment for grinding long knives can be furnished with this machine.

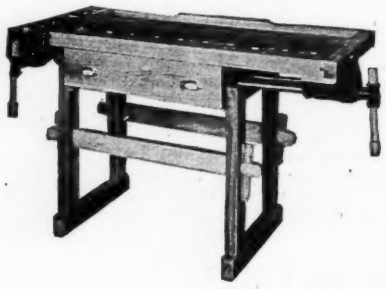
THE FIVE LEADING FEATURES

1. Coarse Oilstone Wheel
2. Fine Oilstone Wheel
3. Grinding Cone
4. Leather Wheel
5. Emery Wheel

ALL AT YOUR FINGERS' ENDS

Send for full descriptive bulletin

MUMMERT-DIXON CO.
Hanover, Pa.



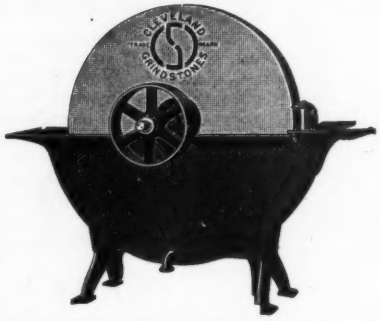
Manual Training Bench No. 270

When in the market for Manual Training Benches, Domestic Science Tables, Sewing Tables, Drawing Tables, Vises, Hand Screws, etc., write to

C. CHRISTIANSEN

Manufacturer of This Line Since 1898.

2814 West 26th St., CHICAGO, ILL.



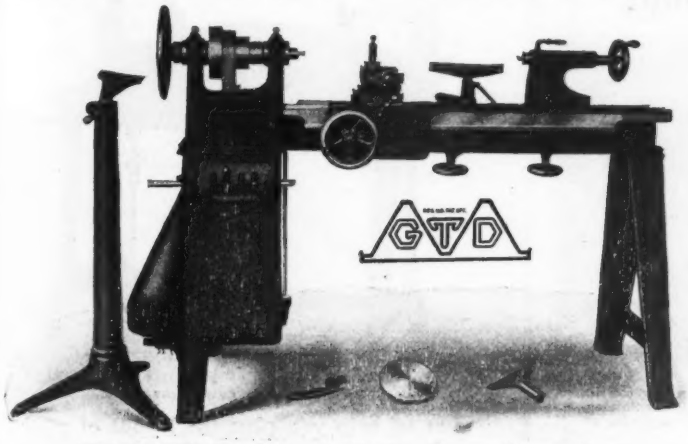
Artificial Wheels Produced *by* The Cleveland Stone Co.

Now you can use artificial wheels that are produced by The Cleveland Stone Company—backed by a reputation of seventy-seven years' standing.

You have used "Cleveland" Grindstones and know their dependability and every one of our Sterling artificial wheels are being made to sustain that reputation. Write for our booklet "77 Years of Grinding."

THE CLEVELAND STONE COMPANY,
1836 Euclid Ave. Cleveland, Ohio

Select YOUR Lathe From Our Full Line



No. 218 GTD Demonstration Lathe—for wood or steel.

When you buy anything—big or little—you like to select the thing best suited to your own requirements, and not be limited in your choice to one or two possibilities.

And so in buying and specifying lathes—be sure that you have our Lathe Booklet, showing plain Speed Lathes, Manual Training Lathes, with overhead, individual motor or underneath shaft drive. Demonstration Lathe for teachers, Bench Lathe, etc.

Our many years' experience in manual training lathe manufacture is at your disposal—and the hundreds of schools all over the country which are completely or in part GTD equipped testify to the excellence of our Lathes.

If you are in any way interested or responsible for the purchase of vocational equipment, or the greater success of vocational classes, write **now** *for our catalog on lathes.*

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS

HUTHER BROTHERS DADO HEAD

The Saw That Has Helped Make New Production Records in Many Plants.

Intricate cutting and grooving is simplified and expedited by the use of this remarkable device.

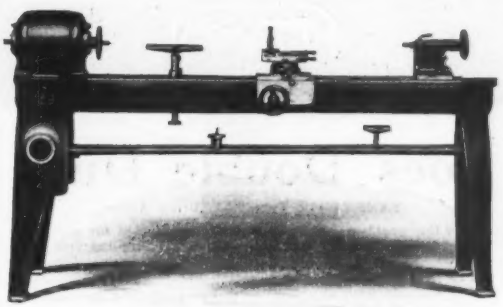
It consists of two outside cutters which can be used in conjunction with as many inside cutters as are necessary to perform the required cut.

We were the original patentees of this type of saw. Into it goes all the workmanship and knowledge of saw making gained from our experience of fifty years.

Send for one on approval. It may be returned at our expense if unsatisfactory.

Illustrated catalogue sent promptly on request.

HUTHER BROS. SAW MFG. CO.
Rochester, N. Y.



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These are the highest development in Manual Training School Equipment. We build lathes of this type suitable for either direct or alternating current. Motors are ball bearing and have convenient speed regulating dials and snap switches. Convenient to operate and every provision made to guard against injury to operator or motor.

We build a complete line of Manual Training Equipment and have a special catalog which will be sent on request.

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Broadway, Tyler, Ninth Streets,
ST. LOUIS, U. S. A.

Do You Sand Work Like This in Your School Shop?

This illustrates a portion of the many shapes which can be belt-sanded to advantage on the Mattison Hand Block Sander. Every woodworking establishment of any size operates at least one hand block sander.
Familiarize your students with belt sanding machine methods as they actually exist in the factories by having them use a Mattison hand-block sander for finishing large flat surfaces and moulded shapes, as well as small pieces and built up cases.

Send for Bulletin No. 138-B showing dozens of interesting operations

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Rockford, Illinois, U. S. A.

CHICAGO GREENSBORO, N. C. NEW YORK SAN FRANCISCO

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Does Double Duty

TANNEWITZ Type "J" Tilting Arbor

Twice the working range possible with an ordinary bench, and does it **easily.**

In vertical position, does anything possible with any ordinary vertical bench.

In tilted position also does any job of mitering which can be done with a tilting table saw.

Since table is always flat, **TANNEWITZ** type **"J"** works with equal ease in any position.

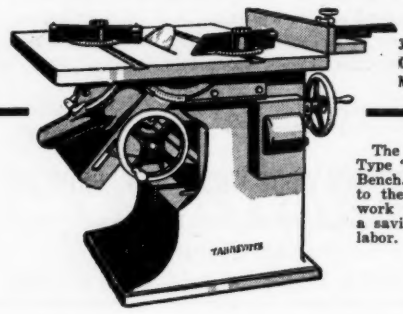
May be adjusted for accurate grooving. Supplied with sliding table on adjustable ball bearings if desired.

Motor is wound directly on arbor at a saving of floor space and power.

Every operating convenience. Every safety appliance.

Write for our special bulletin, it is free for the asking.

THE TANNEWITZ WORKS



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GRAND RAPIDS
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The **TANNEWITZ** Type "J" Tilting Saw Bench. Tilts the saw to the work, not the work to the saw, at a saving of time and labor.

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Queen City Foot Shear

Let us help you plan the layout of your school rooms—give you the advantage of our engineering department's 44 years' experience on sheet metal working problems.

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Established 1879
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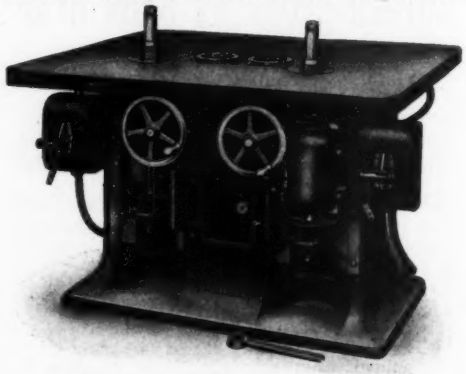
Woodworking Machinery

IMPROVED DOUBLE SPINDLE SHAPER

Driven by Motors directly on the Spindles. With either Automatic or Hand Starters. Mounted on the Machine convenient to the Operator.



The Motors are 5-h.p., 7200 or 3600-r.p.m., and can be equipped to run from any Electric Current. Machine shipped Complete ready to connect to Current or Power. Complete information on application.

H. B. Smith Machine Co.

Smithville, N. J., U. S. A.
Or Nearest Branch
NEW YORK CHICAGO ATLANTA SAN FRANCISCO

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MACHINES AND TOOLS
For
SHEET METAL
WORK

If not already equipped, eventually you will join some four hundred progressive schools in voicing favorable expression for what this course offers and how Pexto equipment has helped to make the work a success.

Our Engineering Department is at your service.

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You don't have to shop around when you buy of us. We carry everything from a rivet to the largest machine used for this work.

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If you are not equipped to teach this course you should investigate. The sheet metal industries need skilled labor and need it bad. The work is healthful, the hours short, and the wages high. Let us send you literature on the subject.

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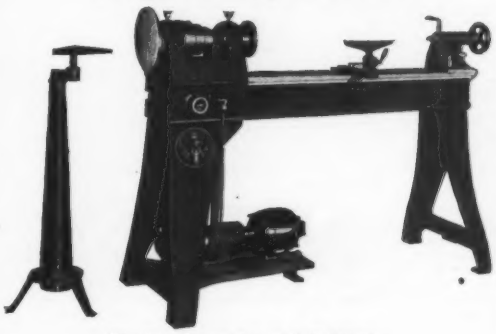
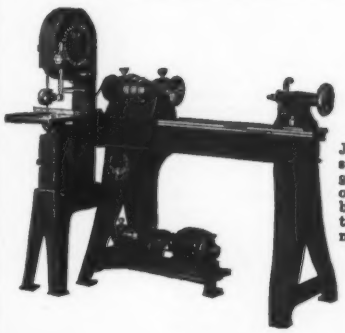
MANUAL TRAINING DEPARTMENT
SPECIAL EQUIPMENT

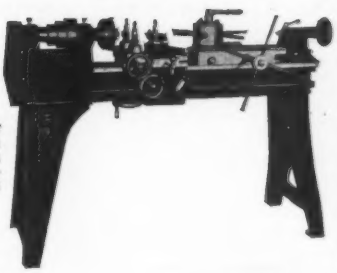


Wood Lathe—motor or belt driven.



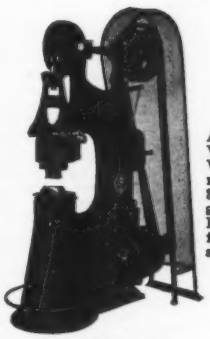
Combination Wood Lathe and Band Saw.

Jointer, planer, jigsaw, sander, buffer, grinder, mortiser and other equipment can be furnished and attached in a similar manner.



Metal Lathe—Motor or Belt Driven.

Miller, planer, gear cutter, grinder and other equipment can be furnished and attached the same as with wood lathe.



Power Hammer—Motor or Belt Driven.

All Little Giant Wood and Metal Working Equipment is sold on 30 days' trial, and guaranteed FOREVER against defective material and workmanship.

Band Saw—Motor or Belt Driven.

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The rate for classified advertisements is $.07 per word per insertion, payable in advance. All wants subject to approval. Minimum 25 words. Forms close on 5th of the month preceding date of issue. Write for discount on yearly insertions.

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Goodrick Student Aprons—size 29"x36"—brown, 60c; white, 50c. Instructor's apron gratis with first order of twelve or more. Shop coats, $4.90. Canvas Products Corporation, Fond du Lac, Wisconsin.

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"Hard-To-Get" Materials—Pulls and Catches, Leg Sockets, Tea Wagon Wheels and Casters, Tray Handles, Costumer Hooks, Steel Rails for Wood Beds, Trays for Smoking Stands, Art Glass, Chair Cane, etc. Write for Catalog. Thurston Manual Training Supply Co., Anoka, Minnesota.

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Basketry Materials—We have everything for basket making, including reeds, willow, chair-cane, Indian splints, ash splints and wooden bases. Send Fifteen Cents for Samples, 65-page Catalogue and directions. This contains illustrations of over 500 baskets, trays, frames, etc., with suggestions as to making them. Louis Stoughton Drake, Inc., 33 Everett St., Allston, Boston 34, Mass.

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Basketry Materials—We carry a complete line of basket making materials including Kindergarten reeds, all sizes, round and flat, in one pound packages. Our line includes raffia, French willows, straw braids, Hong Kong twisted grass, basket bases, rattans, chair cane, etc. The Jayson Company, Inc., 217 Mercer St., New York City.

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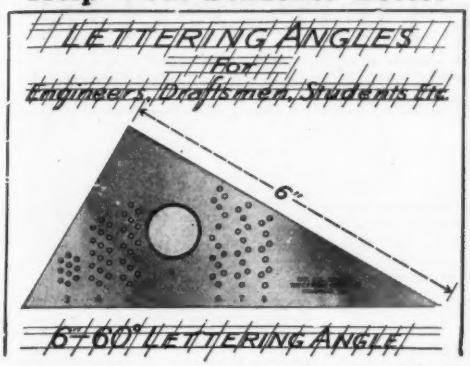

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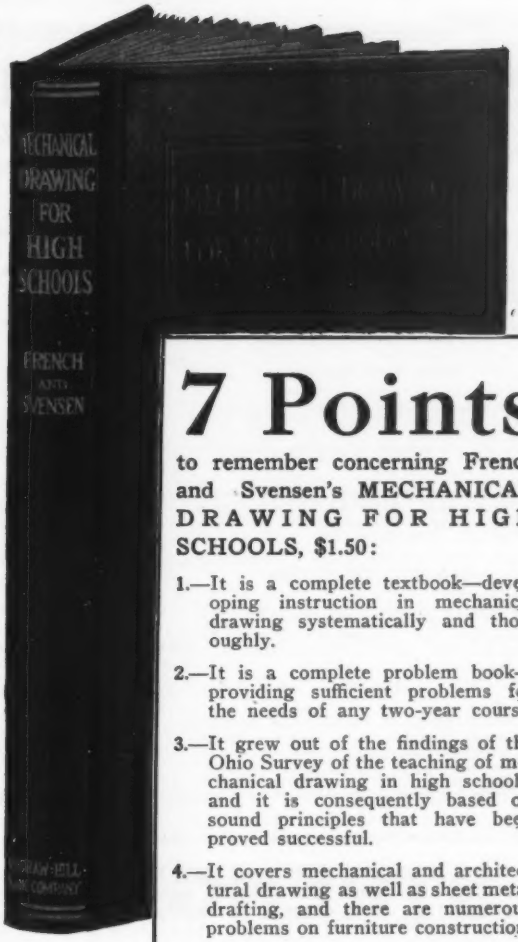

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Pottery Supplies and Equipment—Kilns, Clay Modeling Wheels, Tools, Plaster Models, Moulds, Stilts, Pyrometric Cones, Modeling Plaster, Metallic Oxides, Chemicals. Prompt shipments. Write for new Pamphlet. Wm. W. Wilkins, Lewis Institute, Chicago.

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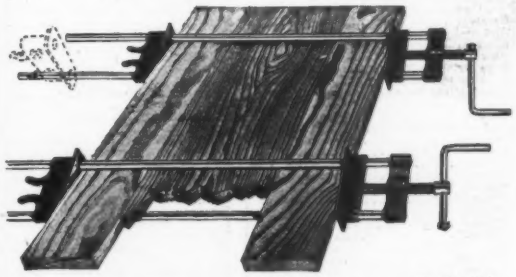

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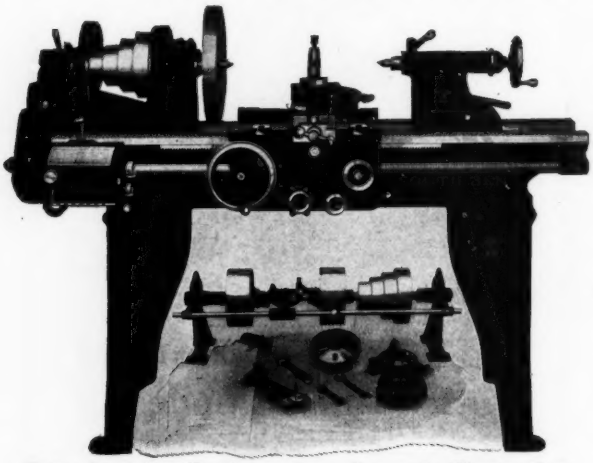

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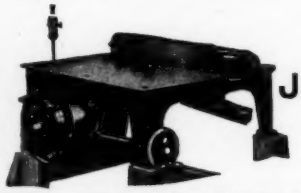

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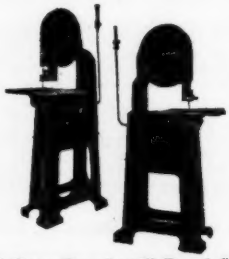

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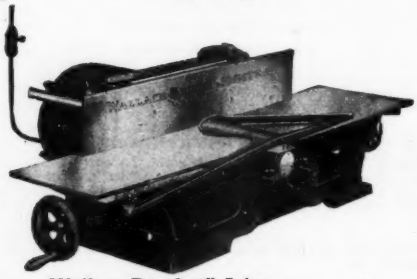

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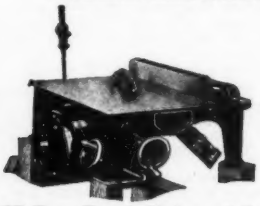

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INDUSTRIAL-ARTS MAGAZINE

Volume XII MAY, 1923 No. 5

Exploratory Opportunities of the Junior High School

Dana Z. Eckert, Latimer Junior High School, Pittsburgh, Pa.

ONE of the outstanding functions of the junior high school is that of providing for individual differences. These differences exist in so many different ways, that of necessity any institution which attempts to provide for them has, by so doing, undertaken an enormous task. There are differences in physical characteristics in race, in sex, in mentality, in interests, in home environment and ideals,—countless differences. In fact, so great are the differences and so insuperable do they seem, in some respects, that the schoolman who plans to adapt the organization of the school to meet their demands is almost discouraged at the complexity of his problem before even attempting its solution.

And yet the junior high school has, in a modest measure at least, succeeded in making a step toward the solution of some of the problems arising from the fact of individual differences. And wherever success has come, it has come through a recognition of this principle: *equality of opportunity for different individuals demands that they shall be given different opportunities.*

The old fable of the fox and the stork was an excellent example of the kind of intellectual banquet which the school was wont to set before its guests. The viands were served in such a way as to be available for some of the dinner party but the rest had to be content with such portions as might come their way by mere chance. We paid little respect to so evident a condition as individual differences. Rather we seemed to say by our manner, "The School is here to serve all who wish to come. Nay, indeed, we believe it is our duty to even compel all to come that they may be educated." And then we adopted the crude methods of Proteus, who with brutal humor made sure that all who slept in his bed should be of a proper size, and who accordingly lopped off feet and legs of those who were too long, and stretched on the rack those who were too short.

The junior high school is building a program of studies around the belief that whether or not all men are created equal it is an assured fact that they are not created alike. It does not believe that what is sauce for the goose is therefore sauce for the gander. It assumes that *equality of opportunity* is not synonymous with *identity of opportunity.*

Any discussion of exploratory opportunities in the junior high school must, therefore, begin with the general attitude or viewpoint of this new type of school, rather than with an enumeration or description of specific courses offered in its daily program.

Probably no better statement of the spirit or motive back of the junior high school idea has been made than that which has been stated by Dr. Briggs as the general aim of the Speyer School:

First: "To teach pupils to do better those desirable activities that they will do anyway and to teach these by means of material in itself worthwhile."

Second: "To reveal higher types of activities and to make them both desired and, to an extent, possible."

The whole spirit of these two major aims is to give a wider opportunity to pupils of unlike abilities and tendencies to best realize the utmost development of their capacities. And these aims are, in a sense, complementary to each other. The first looks to those relationships, duties and activities which all of us have thrust on us because we are members of a complex society. It recognizes that there are tasks which each of us must do and that it is the function of the school to teach and to train that we may do those tasks in the most efficient, thorough and satisfactory way possible. The second takes cognizance of the fact that man does not live by bread alone. It would make provision for some of the finer things which would otherwise be missed. It undertakes to lead boys and girls up ladder after ladder to that lofty platform, from which they may view in proper perspective, the scheme of things as they are. That may sound rather ambitious an aim for a school which has to deal with so immature a being as the early adolescent. Perhaps it is, but surely we will grant that if it is to be done at all for many, it will have to be done even now, for some of them will never grace the halls of the senior high school to say nothing of the college.

On the day that the boy or girl enters the junior high school he has embarked on a voyage of exploration.

The little 7B grade boy who wrote the following editorial for the seventh grade number of "Latimer Life" had caught this vision as he was inspired by the design on its cover which portrayed a Viking vessel in full sail scudding along on the crest of the puple waves.

"The seventh grade students have during this past year embarked in many sailing ships for a long voyage, which will carry them over a period of three years. This voyage will end when the ships return to port at the close of the ninth year. Now these ships are crowded with curious seventh graders, anxious to see and master the things that come their way. On their return, how many will have completed the voyage, we wonder. With what treasures of knowledge will they be laden. We sail on wondrous seas, stopping at strange and marvelous lands where there will be many worth-while treasures for us to gather."

The school recognizes from the first that the pupil is different from his fellows. The fact that he is assigned to one class rather than to another is determined on the basis of different performance in certain intelligence tests. He is no longer grouped with other boys or girls because he comes from the *same* school, or from the *same* neighborhood, or because he is of the *same* age, but he is placed in "7B-3" rather than in "7B-1" or "7B-6" because he is *different* from the pupils in those sections.

Indeed, one of the outstanding characteristics of the junior high school is that boys and girls are thought of as separate and distinct individuals. Even, though the exigencies of administration force the grouping of 35 to forty or more pupils into one class, yet there is little else about the school which indicates that they are considered en masse rather than as individuals. Problems of schedule making, of discipline, of vocational guidance are all worked out on the latter basis. The circumstances and needs of this particular John Smith or that Mary Jones are the deciding elements in the final adjustment that is made.

Thus, we have in its very organization, in its program of studies, and in its viewpoint, emphasis upon the differences or variations which exist between its students. What follows is a more or less detailed exposition of the particular ways in which the school looks after the individual's progress and in which it provides means of self-discovery.

We have already mentioned in a preceding paragraph the method of classifying pupils. All 7-B pupils entering the school are grouped on the basis of their performance on certain standardized intelligence tests. Greater homogeneity of grouping is thus secured, enabling the classroom teacher to adapt her subject matter to the capacities of the particular class which she teaches. Under such conditions both dull and bright pupils are enabled to make more rapid progress. The variation within particular classes is reduced. The differences between class and class are increased. Although there is no marked difference in time allotment, yet such classification provides for more successful and more encouraging results than existed under the old-time plan.

GENERAL SHOP, LATIMER JUNIOR HIGH SCHOOL, PITTSBURGH, PA. SHEET METAL EQUIPMENT AND STALLS FOR ELECTRIC WIRING PROJECTS.

All seventh grade pupils that enter Latimer are given about the same course of study. But the boys are scheduled to what is known as the general shop for their shopwork. In this single shop we have equipment for teaching all of the different lines of industrial arts represented in the other shops of the school. Here are found lathes for wood turning, light machine lathes, booths for teaching electric wiring, benches for bench-work in wood, the various machines and tools used in light sheet-metal work, type-cases and a press for teaching printing, all within one shop and taught by the same teacher. It is not a "tinker shop." Boys are not taught to tinker or to "putter" with this or that. Its purpose is purely exploratory.

The uninitiated will throw up his hands in dispair and demand: "Do you mean that it is possible with such equipment to teach 7B boys all about machine work, or

electricity or printing?" The answer is easily given. No. Such a thought is the farthest thing from the mind of instructor or principal.

But we do maintain that there is a sufficient body of subject matter in any of the lines of shopwork mentioned which is not too difficult for a 7B boy to understand or to learn. These things are not only within the range of his comprehension but they are worth knowing. In his everyday associations at home and among his playfellows a knowledge of these things will make him more intelligent and useful. The subject matter is valuable for its immediate usefulness but it carries a more remote value as well. These operations which he learns in the general shop are similar to operations which are performed by the skilled mechanic in his everyday work. They are typical of certain portions of the trade which is represented in the shop. With the proper instruction the boy has not only learned how to wire up a door bell, or to set type and print tickets for his class basket-ball team, or some such project but he has also learned that there is more in both of these trades which is very similar, and that also, there is far more which it is quite impossible to learn in the few hours which can be given to any one of the kinds of shopwork in this shop.

Boys are assigned to one type of work for five weeks at a time. At the end of the five weeks they are moved to a different type. In a semester they have practically covered each of the five varieties of handwork. To do this it is necessary to combine electricity and printing in one five-week period. This plan reveals to a boy whether he has any aptitude whatever for mechanical things. And if he has, it will also help him to decide whether he prefers woodworking to sheet-metal, or electricity to machine shop practice. He has a far better basis for selecting his course of study at the end of the seventh grade because he has actually tried out these five kinds of mechanical or practical arts. The instructor is also in a position in which it is possible for him to give definite advice and counsel to the boy as well as to the vocational counselor. His shop record presents data which is valuable at the time that the boy is called upon to make a choice of his course of study or curriculum at the beginning of the eighth grade.

A second form of try-out experience in shopwork is that which we find in the technical course. Students who elect this course are assigned to one of the regular shops at the beginning of the semester. They remain here during the first ten weeks and then they are moved to another shop. This "rotation of shops" is continued at the end of every ten weeks. The courses for boys electing the technical arts curriculum are planned on the same principle that was stated in connection with the general shop courses. There is no intention to teach the boys all about electricity or printing but it is recognized that for eighth grade boys there exist a number of projects in each of these special fields which have the two-fold usefulness which we found in the seventh grade projects. They can be used in the boy's home and they serve to open a little wider the door which leads to the field of industry represented by that shop. The course of study is arranged on the "spiral" form which has been adopted in other subjects which have found their way into the junior high school curriculum. The "rotation of shops" in the technical course and the "rotation of work" in the general shop thus supplement each other

ANOTHER VIEW OF THE LATIMER SHOP, SHOWING EQUIPMENT FOR LIGHT MACHINE WORK.

in giving a glimpse of the work which the boy would find were he to go into the industry as an apprentice to learn the trade. Both plans aim to give the student a sample of these industrial occupations. The main difference between them is in the length of time which is spent on each particular kind of shopwork. There is, of course, this other difference, that the work in the eighth and ninth grades is more advanced and difficult than that in the seventh grade.

The general administration of the entire junior high school program is such that a pupil who elects a certain course of study and then finds that it is not the sort of work which he wants or needs may change his course without unusual difficulty. Of course we do not encourage indiscriminate skipping from one thing to another just because of whims or from mere capriciousness. Whenever it is evident that there is a genuine lack of interest, or lack of ability the way is open to make a change.

Take for instance, a pupil who has elected the adademic course at the beginning of the eighth grade and has begun the study of a foreign language, Latin or French. The presumption is that the matter has been discussed at home with parents and in school with the reporting teacher and the counselor. We have a right to suppose that the student has made the choice advisedly and for a good reason. Where there is a definite program of guidance the chances of choosing a course of study for trivial reasons is lessened. But with all the care that is exercised in advising pupils there are always some who find before the end of the semester that they are not taking the course which they should. They fail in Latin, or they discover in general mathematics another source of difficulty. They have talked things over at home and the family conference has resulted in the decision that James is to go to work in the insurance office with his uncle instead of becoming a lawyer. The course itself has helped the boy to discover that the type of education necessary for legal pursuits is not to his liking. Perhaps the mistaken ideas of parents regarding the ability of the child, or a false notion regarding the higher social exponent of the academic course has resulted in a boy or girl electing that course when they should have taken the technical or vocational course. A semester's try-out of the academic work is sufficient to reveal the lack of wisdom in attempting to force the child to do something for which by nature he is not fitted. The different courses on the school program may thus become exploratory courses.

It has been the custom at Latimer Junior High School to recognize the exploratory nature of all of its courses. And in the administration of the school there has been a definite understanding that pupils shall not be penalized for failure under such conditions. A pupil who has failed in Latin in the eighth grade may change to the commercial or technical course without being required to repeat and pass the Latin. His progress in school is thus not needlessly delayed because of a mistake on his or his parents' part.

We would not give a complete picture of exploratory opportunities in the Junior high school were this paper to end without mention of the many and varied lines of work which are open to its pupils in extra-curricular activities. Its student government organization provides places for about four hundred different pupils each semester to serve in various capacities as class representatives or associate representatives and secretaries, as members of the various squads-patrol, lunch room, auditorium or ushers. In every one of these types of service a boy or girl has a wonderful opportunity to display and develop any latent qualities of leadership, initiative helpfulness and the other qualities which mark the leader in school citizenship. The organization is in reality a course in *citizenship*. Those who show special capacities for leadership are used in superior positions as supervisors and are thus given more opportunity for further development.

A list of Latimer's clubs will give some idea of the many kinds of adolescent interests which are provided for in the weekly program of the school. Here we find, pen and ink club—the editorial staff of the school paper, the officials' club, composed of boys who referee the class basket-ball games, boys' glee club, girls' glee club, dramatic club, girl scouts, boy scouts, millinery club, motor mechanics club, nature club, folk dancing, girl reserves, radio, audubon, debating, electricity, life-career and know-your-city clubs as well as a social activities' orchestra. And these by no means exhaust the list. There is scarcely any legitimate interest of the junior high school boy or girl which is not represented and they all provide some of the exploratory experiences which we need if we are to make intelligent choices in life.

Although this paper has suggested a number of ways in which the Latimer Junior High School is actually giving attention to the try-out phase of its curriculum, yet there are none who are so well aware of its need for an even more varied offering as are those who are working in the school from day to day. Dr. John M. Brewer, Director of the Bureau of Vocational Guidance, Harvard University, in his visit to Latimer last year, expressed the feeling that there should be a course for girls which would present a number of different kinds of work related to the household arts in the same way as the general shop does in the field of industrial arts for boys. There should be try-out courses of seventh grade difficulty in the field of Commercial education and in foreign languages. Such courses would give a much more satisfactory basis of choice at the end of the seventh grade than is now possible. Our hope is that these suggestions may soon become a part of our actual school program. Diagnostic and prognostic tests will aid in this problem of guidance but there will probably be need of exploratory opportunities in the junior high school for some time to come.

Some Administrative Phases of an Automotive Trades School - II

The Two Year Day Course

Ray F. Kuns, Cincinnati, O.

Time Division.

AS indicated in the previous article the day course in the Automotive Trades School was opened at the close of the world war. In this article will be recounted some of the results of four years' work. The division of time within the school was, of course, one-half shop and one-half related subjects. When first organized the plan was to give each student a half-day in shop and a half-day on related subjects each day. This worked pretty well so far as the related subjects were concerned but not so well with reference to the shop. The problem there was one of shop routine. A boy would be placed on a job which was brought in to be repaired. The owner of the machine would want the job completed as quickly as possible. When the boy went to his related subject work the job either stood still or some other boy from the incoming class was placed on it. In the latter case the instructor encountered much trouble in starting the second boy on the job, owing to the fact that he was breaking into a piece of work already started. At the end of his day in shop he returned to class and the first boy returned with the result that he in his turn had to be broken in on the job again.

Even worse than this from a pedagogical point of view, was the shirking of responsibility for all or part of the details of the job. Each boy had been preceded and would be followed by another boy on whom he could fasten blame for any lost parts, any broken or damaged parts and poor work. Knowing this he lost interest in his responsibility for putting the job over. If a trade school is to be worthy of its name, it must so arrange its program that each student has an opportunity to approximate real trade conditions. There are many of these—only a few of the most important will be mentioned as having a direct influence on the action taken to remedy the above condition.

Apprentices in the trade work from 48 to 54 hours per week. A job is assigned them. The responsibility for completing this in proper time and manner is their own. The responsibility for playing square with their foreman and the job rests on only one pair of shoulders. If a grease cup in some inaccessible place is neglected the boy has no one on whom to blame his failure to perform the work. If parts are lost there is no question of the guilty or careless party. If work is poorly done there is no question of who is at fault.

These are trade conditions and in order to train boys to meet them in their apprenticeship, they must have actual practice in meeting problems in their school work and have first hand acquaintance with handling them. Accordingly the entire scheme of work was reorganized. Instead of changing from shop to academic work each day, the change was made at the beginning of each week for the entire week. A boy going to the classroom for related subject work was given to understand the fact that that was his job for the week. He alternated between the several classrooms and instructors on a regular schedule. The following week when he went to the shop he knew that he had thirty hours of work under one instructor ahead of him. He knew that the job assigned him would be waiting for him on the next day if it was not finished the first one. He knew that he must make good or be marked a failure. There was little chance of blaming lack of time or another boy for his failure. Thirty hours a week is not 48 or 54. It is, however, a continuous stretch of time about as long as is possible to be arranged within a school program. If a boy can go for this length of time without serious failure in some of the items mentioned above, there is exceeding likelihood that he will make good when placed in the trade with the longer periods of intensive devotion to tasks expected of him.

Under this plan work moved through the shops, interest in both shopwork and related subjects work was improved and the tone of all work in the school was higher. While it had been felt that the amount of time spent on academic work might prove trying to those who had no liking for this type of work the results were rather satisfactory even here. Students understanding that they had no shopwork during that particular week set themselves with good interest to do the task in hand. They were able to keep their work neater and cleaner, with less loss of time from changing of clothing, washing hands, etc. The tone of the class or academic work was improved. This item of dress has just as great a bearing on the shopwork as it has on the related subject or academic work. The longer period allowed boys time to strip off their street clothing and get into their coveralls. With their "good clothes" safe in the locker, the greasy jobs had no terrors for them. As a matter of fact dressing the part is just as important for school boys as it is for any one in any other position in life.

Subjects Taught and Rating.

If the reader will refer to the illustration of the grade card Fig.1 the related subjects taught will be noted above the central dark line. The shop subjects may be noted below this same line. The grade or record cards are arranged for a weekly grade in each subject for ten weeks. At the end of each ten-week term the cards are sent to the pupil's home for the signature of the parent. The check marks on the card show how the card is used in actual rating. The first week the boy receives grades in each related subject being pursued. The second week

he receives a rating for his entire week's work. The grade appearing on the card is the one which has been compiled on his shop rating card. This card. Fig. 3, is kept by each student for each week which he spends in a shop class. It needs no particular explanation except to say that it eliminates much guesswork, on the part of the instructor. It is marked at least once each day, oftener if the jobs are such as to make this necessary. It is printed on light manila stock to stand shop usage.

The grades are averaged for each subject at the end of the ten weeks' term and the final average for the related subjects is placed in the little block set off to the margin as is also the average for the shopwork in the lower block. Academic or related subjects are carried for the fifty weeks' year; that is, this schedule corresponds to the usual high school method of program arrangement. Civics receives a certain number of periods or recitations each week as do each of the other subjects. In all forty periods of 45 minutes each are in the schedule for the week. At present 21 of these are recitation periods, four are study periods and fifteen are laboratory periods. The 21 recitation periods and the four study periods come in the morning and the laboratory periods in the afternoon. Mechanical drawing, electrical laboratory, and general science or physics laboratory are the subjects taught in the afternoon. In the ten-week period each student gets a period of intensive work in each of these departments.

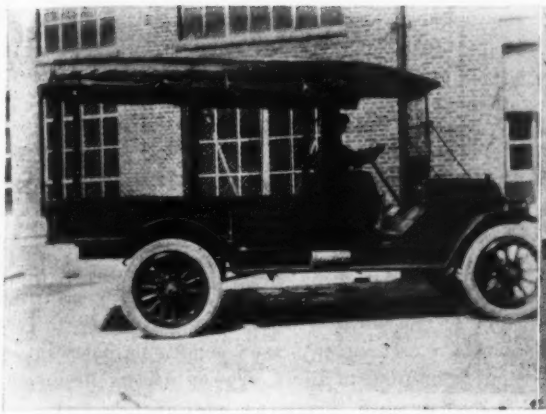
Plan of Shop Work.

The shopwork for the first year is a matter of shifting the students from one department to another at the end of each ten weeks. This plan gives each student about 150 clock hours of shopwork in each subject appearing on the grade card. These subjects correspond to the departments of the school, as for instance, the service department or the chassis department. As a usual plan the first-year students are started in chassis or the machine shop department, to be followed by work in the engine department, the electrical department and other phases leaving until the last the service department.

TOP LEFT—RESEATING VALVES.
BOTTOM LEFT—FITTING MAIN BEARINGS BY SCRAPING.
TOP RIGHT—FITTING CONNECTING-ROD BEARINGS BY SCRAPING.
BOTTOM RIGHT—TAPPING PISTONS TO FIT IN CYLINDER. (WORK IS DONE WITH BLOCK IN VERTICAL POSITION.)

With as many as a half-dozen new classes starting at any September term opening, it is impossible to start all in at the same point in their shopwork. The most desirable point is the machine shop but since the number which can be handled here is limited, certain classes must be assigned to other departments for at least the first ten weeks' term.

The reader, if accustomed to the usual plan of school administration, may have some difficulty in understanding the plan used. To clear this up as compared to



AFTER A ROAD TEST ON AN OVERHAULED TRUCK.

INSTALLING AN ENGINE AFTER AN OVERHAUL JOB.

the usual high school plan, it may be said that the student's shop period is thirty clock hours in length. He is to give five of these in the first ten weeks' term to machine shop work, five in the second ten weeks' term to chassis work, five in the third ten weeks' term to engine work and so on, for the first year of fifty weeks. Thus is his half-time on shopwork arranged for him.

His half-time on academic work as explained previously is more closely patterned after the conventional idea. One department only is especially reserved for second-year students, this being the one known to the organization as the service department. To acquaint the reader with the plan of instruction in the several shop departments a short discussion of each follows.

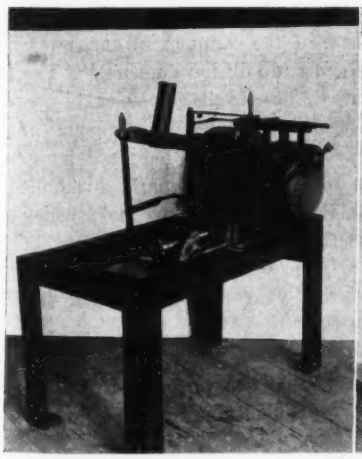
The Chassis.

In the *chassis* department are grouped together rear axles, front axles, steering gears, transmissions, universals, clutches, etc. Some of these items are still assembled on the frames of the cars. Others are grouped on stands with similar units. One complete chassis is mounted on pedestals with a one horse-power electric motor belted to the flywheel. This device is used to instruct on power transmission and the relation and functioning of the interrelated parts of the chassis. The transmission gear case is cut away, as is also the rear axle housing, to allow of free inspection of working parts. As these parts are driven at slow speeds the student may note clutch action, gear changes, and direction of drive, etc. With these fundamental matters in mind the student knows the position and purpose of the separate parts as he is put to work on them, disassembling, inspecting and reassembling.

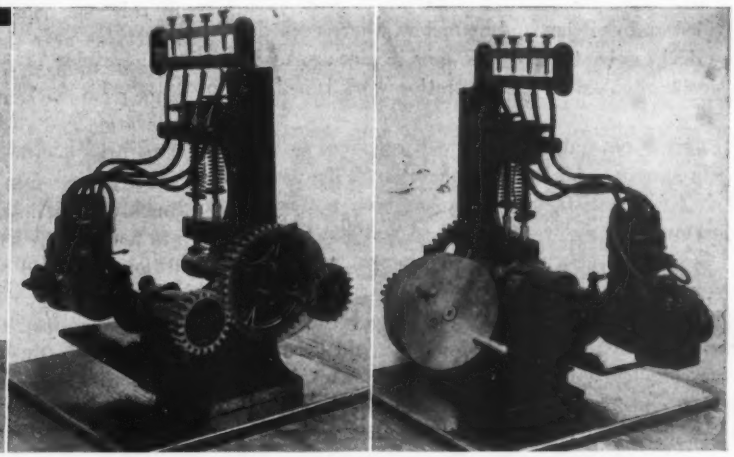
In selecting equipment for this department, types were kept in mind rather than some particular trade make. To make this clear it may be said that in selecting rear axles, an effort was made to secure representative makes of the plain live, the semi-floating, the three-quarters-floating and the full floating axles. In like manner other units were selected. Where hundreds of students work over equipment it becomes worn and must be replaced, from time to time. This is true in all departments. In this department the students are taught to make adjustments just as though the parts assembled were to go into service on the road. All nuts are in place, lock washers where needed, cotter keys are used and the job made a finished one. Telling without doing bears small weight in habit formation.

The Engine Department.

In the engine department an effort is made to have engines representative of every type. To have every



MACHINE FOR DEMONSTRATING BRAKE ACTION.



FRONT AND REAR VIEW OF MACHINE FOR DEMONSTRATING IGNITION SYSTEMS.

make is quite another matter indeed. It is possible, however, to have representative models of the L, I, T, F heads, the V type, etc.

Engines may be divided into several classes with reference to purposes of instruction. These are: Engines for teaching fundamental design and construction; engines to be dismantled, repaired and reassembled, and then run under their own power to prove the workmanship; and finally the engines which are not dismantled, unless in case of actual failure of some part but are kept as complete units for tests, minor adjustments and trouble shooting. Engines of the first mentioned class are not equipped and are never operated under their own power. The other classes are equipped and fitted for cooling. For purposes of study of design and operation several cut-away engines are available where, as the engine is turned over slowly by hand, the interrelation of parts is learned. Sectional carburetors are also available.

The ideal operating condition of any engine is not obtainable without some device for testing the power output. This is a field as yet to be developed in this school. Much, however, is hoped for in a water dynamometer now in process of construction.

The Electrical Department.

The electrical department is subdivided into ignition and starting and lighting. Incidentally this department is perhaps the most difficult to develop and to give clear cut instruction. For instance, in teaching ignition, it is rather a hopeless task if nothing is available but a lot of battery ignition heads and modern magnetos, with no method to show their relation to the engine itself. It is possible to teach much about ignition in the engine room but this does not always suffice. To facilitate this piece of work an ignition stand was designed—after years of failure—in which are incorporated all elements appearing on or in an ignition system. The engine timing gears, the cams and valves used, the engine fly wheel, and the ignition unit drive or gears are all incorporated. It is built on a skeleton casting so that all working parts are readily visible. Firing orders may be worked out, wiring is complete, plug gaps are provided and switches and ammeters where needed. Of these devices about twenty are now in place so that that particular problem of administration work is believed to be solved.

This is not quite so true with reference to instruction in starting and lighting phases. In the past quite a lot of very satisfactory work has been performed on generators needing overhauling. A test stand was built and as fast as these pieces of equipment were repaired they were mounted on it and an actual running test was made. The better plan would seem to be a number of stands on which individual students could be placed to set up complete starting and lighting systems, with wiring and lighting equipment all in order. This would insure at least a part of the much needed experience of running and testing leads. The writer has something in the way of equipment to put over this task pretty well in mind and hopes to be able to offer a description of it to the readers of this magazine along with the ignition device in the near future.

The Battery Department.

The battery is a specialized piece of work usually offered to those who wish to follow it as a trade. All are given some instruction on battery care and repair, but those following this line are given enough that they are competent. The task of supplying batteries for the school keeps one charging line busy and furnishes the needed experience in charging. Rebuilding is furnished from several sources. The batteries in use about the school are used under unusual conditions and need attention from time to time. Owner drivers in the night classes frequently furnish work for the day classes. The board of education supplies a certain amount of work.

Another phase of work attempted here to give the necessary experience is building new batteries. In this case the parts are purchased from the factory and from them the new batteries are constructed. This entails burning in groups, building up elements, assembling them in jars, assembling jars in cases, sealing, burning on connecting links and terminals, charging, discharging and recharging, adjusting electrolyte, slow discharge test for rated ampere-hour capacity, high discharge test, cadmium test, painting and burnishing. Batteries built thus are the equal of the factory product and can be turned out at less cost. Experimental work in the way of pasting plates is also carried on at times, if the point to be gained seems to warrant.

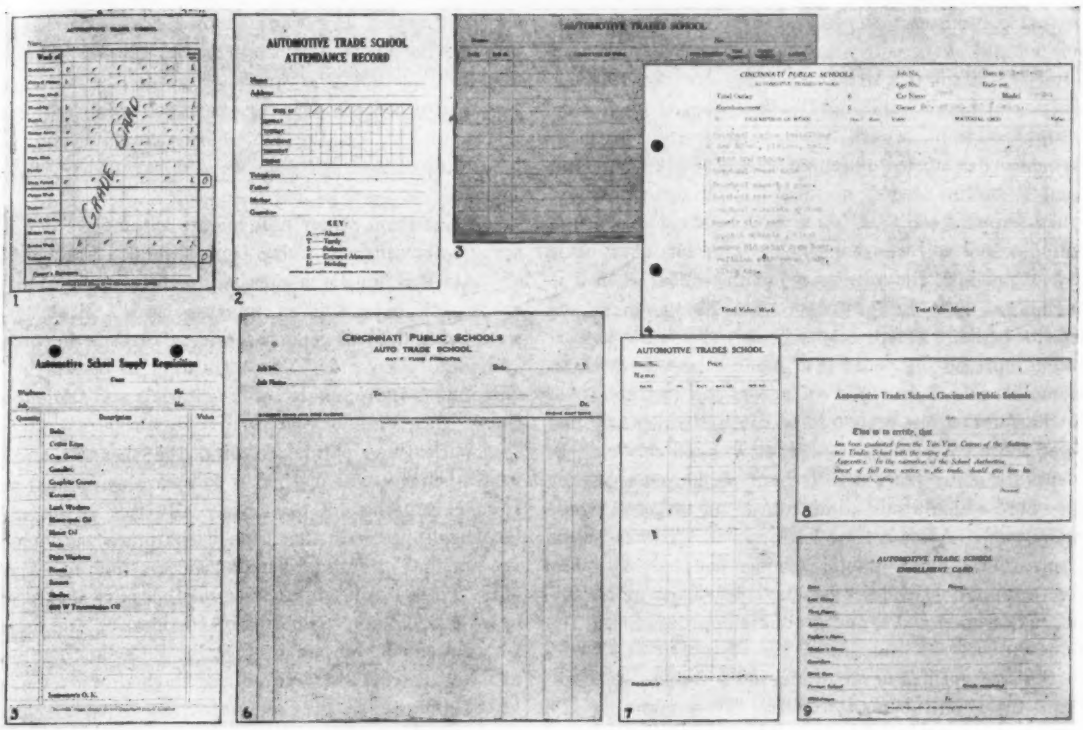
Tire Vulcanizing.

Vulcanizing is a line of work in which young apprentices are seldom interested. They receive instruction on the simpler pieces of tire and tube work. Strength of muscle is required to do the real casing repair work. Apprentices receive instruction on the proper methods of handling rims, demounting and remounting casings, inflating tires, and making simple tube and casing repairs by cold patching and vulcanizing.

The Service Department.

In the Service department cars are taken from the road, serviced and returned to the road. In other words, in this one department alone, are conditions approximately as near those of the commercial garage as it is possible to make them and still have a school. The cars come from two sources, those in the service of the board of education and a certain number from the general public. The first mentioned class always has preference and when turned into the school for repairs is handled as quickly as possible, even though the privately owned cars are temporarily shelved. Private owners have this condition explained to them when they wish to bring their cars. Only such work is accepted as will lend itself to purposes of instruction.

It is in this department that the greatest need is felt for a system of requisition and supply. Parts going into a car being overhauled (board of education or privately owned) must be properly recorded and charged for. The system used in the school is the same for all departments but is explained in connection with the



1—GRADE CARD. 2—ATTENDANCE RECORD ON REVERSE OF GRADE CARD. 3—STUDENT'S SHOP RATING CARD (5"x8"). 4—JOB CARD (6"x9½"). 5—SUPPLY REQUISITION (5"x8½"). 6—BILL HEAD (8"x9"). 7—STOCK CARD (3½"x8½"). 8—APPRENTICE RATING CARD. 9—ENROLLMENT CARD.

service department.

When a job is accepted it is assigned a job number. A job sheet, Fig. 4, is made out. One copy of the sheet is sent to the instructor in charge, the other copy being filed in the stock room. As the work progresses the student apprentice is in need of material and parts for repairs. He can secure no materials or parts, except he presents a properly executed supply requisition, Fig. 5. To facilitate the use of these blanks the most needed items are printed, space being left at the bottom for other items. Filling out these forms is just as educational as is the installing of the part after it is secured.

The requisitions are all filed as they are filled. When the job is completed the actual value of materials and parts going into it is readily compiled from the requisition files. Sometimes as ofttimes happens two or three departments may have had a hand in completing the job. This entails no confusion since the stock keeper has a record of all jobs under way in the shops, and he alone issues supplies.

Invoices, Fig. 6, are made out in duplicate The original is filed and the duplicate is sent to the customer if the car is privately owned. When the invoice is paid the principal of the school stamps each copy as paid. The owner receives his copy and the other is returned to the file, where it is held until such time as the money is turned over to the clerk of the board of education. This is done through the head of the vocational education department who stamps each invoice as paid to his department. Several methods were tried for handling this but were found to be too cumbersome. After several years of effort this was hit upon as requiring the least amount of the principal's time.

In the case of the work done for the board of education, just as careful records are kept and an invoice rendered. In this case, however, no funds are handled, but a transfer of funds or credit is made by the clerk of the board when the invoices are submitted to him by the head of the department. No charge is made to the board for labor, but a careful estimate of the value of the work performed is placed on each invoice. In the case of the privately owned car, the only charge made except the list price of materials used, is an overhead charge. This is not heavy but is calculated to help keep the tools and equipment in condition, and to protect the school from the occasional unscrupulous person encountered here as elsewhere, where there is a chance of getting something for nothing.

The stock room carries a certain number of car parts and a general line of supplies used in automotive repair work. To keep the stock parts in order a stock card, Fig. 7, is used. Its operation is simple and it is calculated to give an invoice at any time.

Most of the work in this department is handled by second year students as was mentioned previously. If possible the first year students are given one term in the service room before they are given positions in the trade as co-ops.

Cooperative Education.

In the working of a cooperative education plan a number of difficulties have been encountered. Gradually and pleasant. As we write this an authorized dealer of they are being ironed out and the way made more smooth

a certain popular car calls us and says: "We are organizing a night shop, will you come out and help us find the men?" This is a little out of our line, we have apprentices in his day shop and cannot send them to him for night work, but we will try to help him find his men. The school has turned out three classes of graduates and among these the needed men may be found, or possibly, as has happened before, some of the students in the evening school will want a chance. This sort of thing is as sweet music to those in charge of the school when it is remembered how garage owners and garage managers used to belittle automobile schools. To walk into a garage, representing yourself as being connected with an automobile school was to invite sneers and insults.

The writer has been told so often, "Oh, yes, I had one of those boys once but—" that it will likely ring in his ears for many years still to come. He looked about for a password which would admit him to the respect of these worthy men. After a time he found it. It was public schools. The name public schools coupled with the name automotive trades school and the facts of no tuition, taxpayers' money, and graduate apprentices put the campaign over.

This school has never graduated a student as a mechanic or a journeyman worker. True many of the graduates go out as mechanics almost at once, others into their own businesses, but the school does not care to insult intelligent men and employers by telling them that it turns out finished mechanics. It simply says: "We will furnish a good apprentice. Advance him as fast as you like, if you find him worthy." Today and at a number of times previous to this, it is and has been, impossible to meet the demand for good apprentices, although the name apprentice was not known to the automotive trades in this city at the opening of this school late in 1918.

The co-op plan is so well understood that no space need be given to an explanation of its operation. In this case the second-year student apprentice spends two weeks in the trade and two weeks in the school, turn-and-turn-about. Where a student is finding his niche in the trade the school will bend every effort to make him efficient in his line. On graduation each student is given a diploma and the card appearing in Fig. 8.

Selecting Equipment.

Most school boards are not over financed. A little money sometimes must be made to do much. This is perhaps just as well as far as a trade school is concerned.

Most of the men in the trade today who hold executive positions of any grade are men who have come up through the shops and through the grease. The best cure for the lad who wants to go to the automobile school to tinker his own car, or to get some easy credit, is to put him on the job of wrecking, cleaning and rebuilding into serviceable units a car which has seen four or five years of hard service.

Aside from minor refinements automotive design is not greatly different today from several years ago. At any rate it is not the modern up-to-the-minute car which needs service, except in unusual cases. Most of the work being done in general service garages is on cars two and more years old. Trade training to be worthy the name must approximate trade materials and trade conditions.

With these points in mind the cheapest and the writer believes best method is to secure equipment units from cars going out of service. By this is not meant those equipped with that type of equipment no longer in use but that of standard makes of cars four to six years old. These can be obtained at small cost, twenty to sixty or seventy dollars, depending on the location and demand for that particular make of car. With this equipment at hand the cars are wrecked and the bodies are disposed of. Engines are grouped into one department, and other units into other departments. The instructor or instructors have then at once trade problems. These units need overhauling. The work can be motivated. The work needs doing which is quite different from dismantling and reassembling units which need no work and which steadily grow into worse and worse repair from this handling rather than being improved by the work done on them. The writer has repeatedly been impressed with the idea that a unit of standard design in need of repairs is worth more educationally than the same unit is when it first comes in new and complete, with all its shine from the factory. Both methods have been tried.

Students.

Students are promoted to the Automotive Trades School from the eighth grades of the elementary schools. They elect it instead of some high school. Very occasionally high school students are enrolled, and even high school graduates take the course. Of eight classes or two hundred boys one class is usually of eighth grade caliber, six are of ninth grade caliber, and the other class is made up of boys of tenth, eleventh, and twelfth year ability. Fig. 9 is a reproduction of the enrollment card which is filed as a permanent record.

Wherever scientific management is intelligently applied one of the tasks which it sets for itself is the encouragement of individual talent. Every device is employed to encourage workers of all grades to exercise their ingenuity by suggestions and by experiments. Scores of valuable improvements are being contributed annually to our industrial life to-day through the encouragement that this new system of management is giving to individuals to let themselves loose in their work to see what they can do in the way of improving things.—Ida M. Tarbell.

Sheet Metal for First Year Trade Classes

Chas. H. Derby, Instructor of Sheet Metal Drafting and Construction, Erie, Pa.

SHEET metal drafting as a correlated subject in high school is comparatively new, for the sheet metal trade was not included in the curriculum until recent years. Previous to this time the nearest approach was an elementary course in "intersections and developments" taught in conjunction with regular high school drawing.

A sheet metal worker cannot master his trade without a thorough knowledge of the principles of intersections and developments; therefore no sheet metal trade course is complete which does not specialize along this phase of drafting. This will enable him to develop the pattern for any regular or irregular shaped object to be made of sheet metal.

The first year's work as outlined on Chart I is the result of many years of practical experience at the sheet metal trade and several years of teaching this subject in high school. The work as outlined is being followed in the Erie high schools and might be valuable to sheet metal drafting instructors in coping with a similar situation.

Aims of the Course.

The aims of this course do not differ materially from the aims of a machine drafting course, except that they must specialize or stress certain phases of the subject.

Aims

1. To teach the reading of simple drawings.
2. To develop the power of visualization.
3. To teach the making of freehand sketches of objects made of sheet metal.
4. To teach the making of neat, intelligible and *accurate* instrumental drawings to scale.
5. To teach the makings of tracings and reproductions of drawings by the blueprint method.
6. To teach the making of neat, legible letters and figures as an aid to clear drawings.
7. To teach intersection of various shaped objects commonly used in sheet metal construction.
8. To teach surface development and shop layouts as practiced in industry.

These aims form the basis upon which the course is divided into blocks or short units and the time allotted to each is indicated on Chart I by heavy lines. Four hours a week are devoted to this subject in the Erie schools.

Lettering.

The same methods used in teaching lettering in all drafting classes in Erie schools are followed in this course. These methods were described in an article on "First Year Mechanical Drafting for High Schools" published in the January, 1923, issue of the INDUSTRIAL ARTS MAGAZINE. Lettering is taught in conjunction with the other units for 30 minutes a week for a period of thirty weeks.

Freehand Orthographic Sketching.

Freehand sketching does not hold as important a place in sheet metal drafting as it does in machine drafting; therefore the time allotted to this unit is much shorter. The main object is to develop the ability to select and locate the proper views.

The first few sketches are made from solid objects as they are easily comprehended. The line conventions are taught at this time and the proper weight of each is insisted upon. Making sketches from objects develops the power of visualization to a certain extent but this is further developed by making orthographic sketches from isometrics and perspectives of objects both solid and hollow. Most sheet metal objects are made from isometric or perspective sketches and not from models. The problems suggested for this unit are P-1 through P-9, Chart II.

Parallel Line Development.

The proper use of the instruments is taught at this time by making first angle orthographic views of some of the objects, isometrics and perspectives used in the previous unit. Also the development of patterns by the parallel line method for simple objects to be made of sheet metal; teaching the proper location for seams or joints; allowance for seams, joints and covering wire; how to notch for them is stressed. This impresses upon the pupil the importance of trade knowledge which must be used in the drafting room and shop.

Trade knowledge is of the utmost importance and should be taught in each unit of the course whenever an occasion arises to do so. It will also be necessary to teach the geometric construction of the rectangle, hexagon and octagon which are used in the suggested problems P-7-9-10-11-12-13-14, Chart 2. Geometrical constructions are taught, whenever occasion for their use arises, not as a separate unit causing a waste of much valuable time.

It is not convenient in the shop to project from the orthographic views of the stretchout, consequently the shop method called "picking off" or transferring the length of lines on the plan or elevation to the stretchout by use of dividers is taught.

Elementary Parallel Line Intersections and Developments.

It is necessary to teach a few more geometric constructions, measurement of angles and division of circles into equal parts during this unit. One of the most common objects the sheet metal worker is called upon to lay out is the elbow varying in the angle or turn made and number of pieces required. It is impossible to place too much stress upon *accuracy* in finding the angle of the cutting line from which the pattern is to be developed. The "picking off" method is used in the development of the pattern. After the pattern is developed for the first or end section, the pupil is taught how to use this pattern for the remaining sections of the

CHART

SHOWING LAYOUT OF WORK TO BE COVERED
IN
SHEET METAL DRAFTING
FOR
FIRST YEAR TRADE CLASSES

MONTHS	FIRST WEEK	SECOND WEEK	THIRD WEEK	FOURTH WEEK	
SEPT.	LETTERING - 1,4,7 REGISTRATION, ASSIGNMENT OF BENCHES; ROUTINE OF DRAWING ROOM SUGGESTED PROB-P1, 2	LETTERING - 2,5 FREEHAND SKETCHING OF STRAIGHT LINE (HOR & VERT) OBJECTS - NO INVISIBLE EDGES 1ST ANGLE ORTHOGRAPHIC PROJ.	LETTERING - 0,6,9 SKETCHING OF OBLIQUE LINE OBJECTS - INVISIBLE EDGES SUGGESTED PROB.-P3,4,5	LETTERING - 3,8 SKETCHING OF CYLINDRICAL OBJECTS HAVING FLANGES AND HOLES SUGGESTED PROB.- P6	SKETCHING
OCT.	LETTERING - FRACTIONS, ARROW-HEADS. SKETCH - RECTANGULAR & ROUND SHEET-METAL OBJECTS SUGGESTED PROB.- P7,9	LETTERING - I, H, L, T SKETCH 2 CONICAL SHAPED SHEETMETAL OBJECTS * REVIEW OF UNIT SUGGESTED PROB.- P8	LETTERING - F, E, N, M USE OF INSTRUMENTS DEVELOPMENT OF PATTERN FOR RECTANGULAR, HEXAGONAL PIPES CUT AT DIFFERENT ANGLES SUGGESTED PROB.-P9,10,11,12,13	LETTERING - K, Y, Z, A	PARALLEL LINE DEVELOPMENT
NOV.	LETTERING - V, W, X	LETTERING - Q, C, O, G	LETTERING - D, B, P, R FINDING ANGLE OF CUTTING LINE FOR ANY ANGLE ELBOW DEVELOPMENT FOR END AND INTERMEDIATE SECTIONS FOR ROUND AND OVAL ELBOWS SUGGESTED PROBS-P15,16,17	LETTERING - J, U, S, &	ELEM. PAR. LINE INT. & DEVEL.
	DEVELOPMENT OF PATTERNS FOR OCTAGONAL AND CYLINDRICAL PIPES CUT AT DIFFERENT ANGLES SUGGESTED PROB.- P14				
DEC	LETTERING - PAGE 103 - C&P DEVELOPMENT OF PATTERN FOR AN OCTAGONAL BRANCH ON CORNER OF SQUARE PIPE AT 90° SUGGESTED PROB.- P18	LETTERING - PAGE 117 C&P ROUND BRANCH ON CORNER OF SQUARE PIPE 90° ROUND ON ROUND EQUAL DIA. 90° SUGGESTED PROB.- P19,20	LETTERING - PAGE 141 C&P OCTAGONAL ON SQUARE AT 45° ROUND ON SQUARE AT 60° ROUND ON ROUND EQUAL DIA. 30° SUGGESTED PROB.- 21,22	LETTERING - PAGE 146 C&P REVIEW BACKWARD PUPILS CATCH UP	ELEM. PAR. LINE INT. & DEVEL.
JAN	LETTERING - PAGE 147 C&P ROUND ON ROUND 90° UNEQUAL DIA.- AT DIFFERENT ANGLES. SUGGESTED PROB.- P23	LETTERING - PAGE 153 C&P CONDUCTOR CUT OFF WITH SWITCH VALVE SUGGESTED PROB.- P24	LETTERING PAGE 154 C&P SCALE SCOOP WATERING POT BREAST SUGGESTED PROB.- P25,26	LETTERING - PAGE 165 C&P PLAIN CORNICE CUTTING 90° ANGLE AND OTHER ANGLES SUGGESTED PROB:- P27, 28	ADVANCED PARALLEL LINE INT. & DEVEL.
FEB.	LETTERING - PAGE 174 C&P SAME AS LAST WEEK JAN.	LETTERING - PAGE 178 C&P	LETTERING - PAGE 179 C&P	LETTERING - PAGE 183 C&P	
		SQUARE OR RECTANGULAR SKYLIGHTS WITHOUT HIPS SUGGESTED PROB.- P29			
MAR.	LETTERING - PAGE 185 - C&P	LETTERING (INK) PAGE 153 C&P	LETTERING (INK) PAGE 154 C&P	LETTERING (INK) PAGE 165 C&P	RADIAL LINE DEVELOPMENT
	DEVELOPMENT OF SQUARE & HEXAGONAL PYRAMIDS BY RADIAL LINE METHODS SUGGESTED PROB.- P30		DEVELOPMENT OF CONES WHOLE OR ANY PART. TRUE LENGHTS IN CONIC SECTIONS SUGGESTED PROB. P31,32,33		
APRIL	LETTERING (INK) PAGE 178 C&P	LETTERING (INK) PAGE 174 C&P			ELEMENTARY RADIAL LINE INTERSECTIONS & DEVELOPMENTS
	CONES INTERSECTED BY CYLINDERS SUGGESTED PROB.- P25,34			CONES INTERSECTED BY CONES SUGGESTED PROB.- P35	
MAY	CONES INTERSECTED BY CONES		PROJECTION IN SCALENE CONES SUGGESTED PROB.- P36	AUXILIARY VIEWS IN SCALENE CONES. SUG. PROB.- P36 WITH VARIATIONS	
JUNE	SAME AS 4TH WEEK MAY	TRACING AND BLUEPRINTING FOR SHOP & DRAFTING ROOM			TRACING & BLUEPRINTING

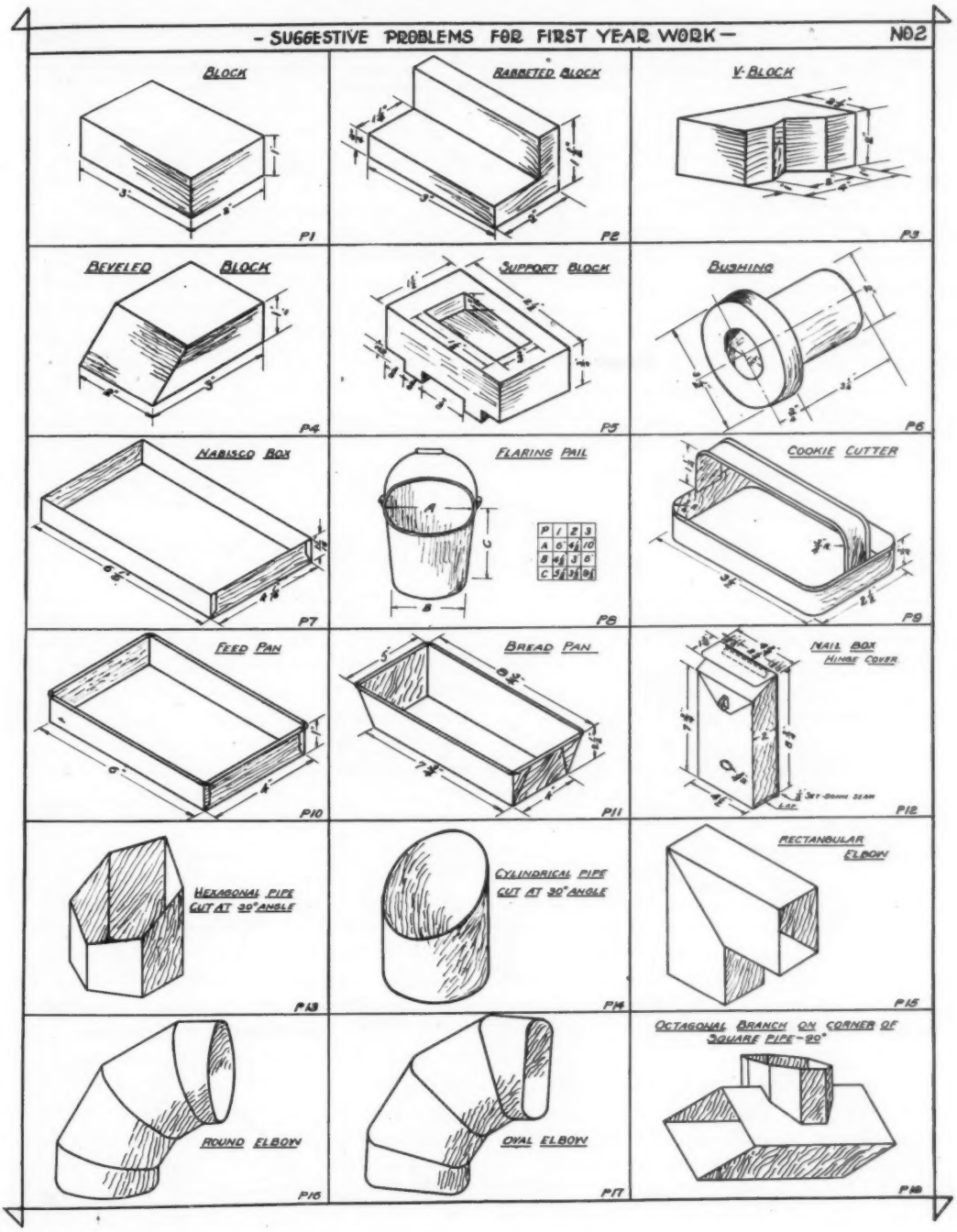
elbow and how to get the sweep when a certain sweep is required, allowing for locks, burrs, etc. and cutting notches for same.

Trade judgment may be developed to some extent by teaching the meaning of "sweep of the elbow;" why and when to use long and short sweeps, and why the fishtail pattern should be used in some instances in preference to the regular style. The method used to lay out the rivet holes for a riveted elbow is also taught.

Simple tee branches are developed, care being given to the selection of orthographic views from which to develop the patterns by both the "picking off" and "projection methods. The problems suggested for this unit are P-15 through P-18, Chart 2 and P-19-20, Chart 3.

Advanced Parallel Line Intersections and Developments. The work of this unit, as its name implies, follows the same line as the preceeding unit but requires a greater power of visualization to make the orthographic views.

The problems suggested for this unit are P-21 through P-29, Chart 3. Two or three of these are simple problems in cornice and skylight work which are all that are given at this time. The more advanced problems in this line are reserved for second-year work where the power of visualization will be much further developed.



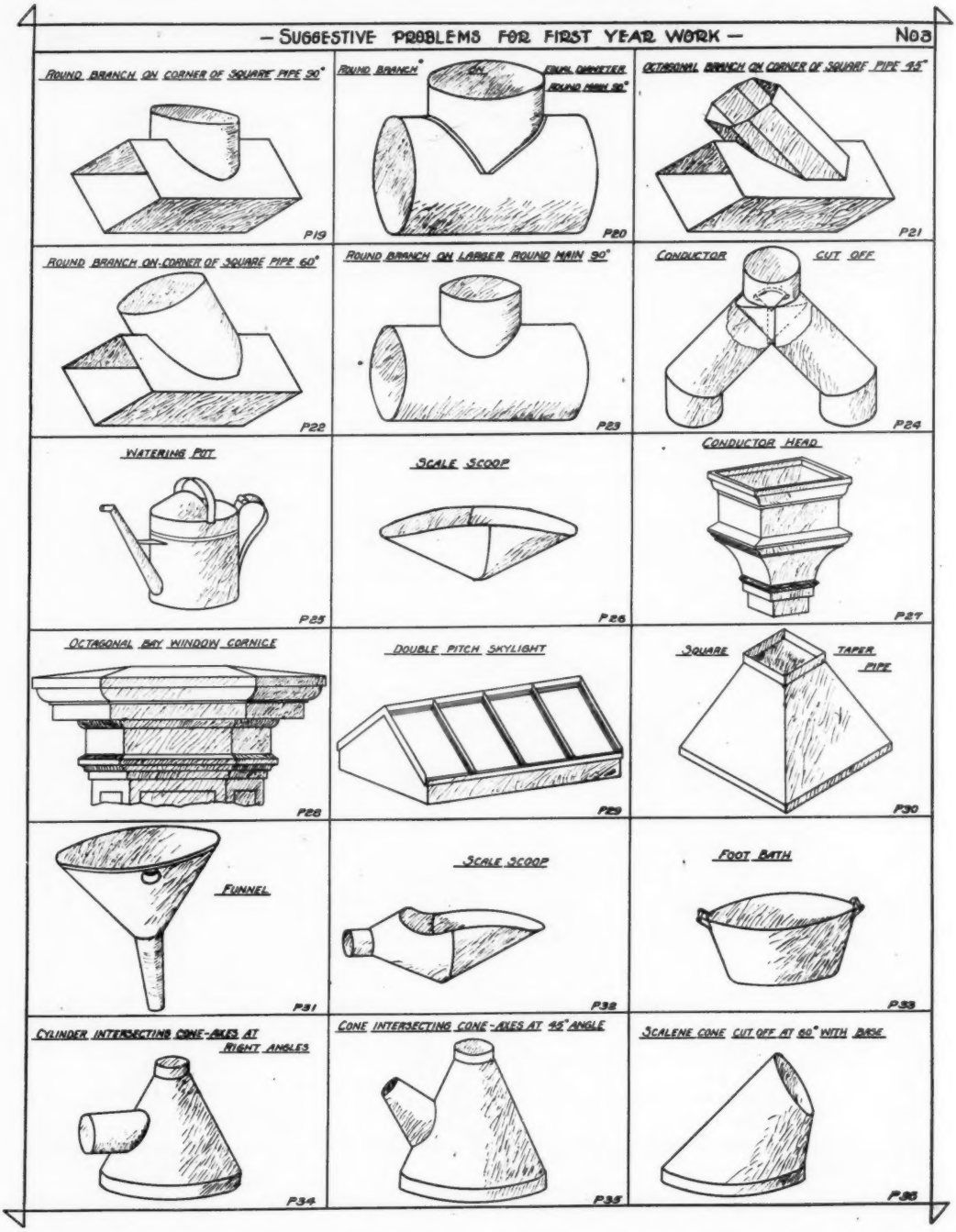
The projection method is used to develop patterns for cornice and skylights and the method used to accomplish this in the shop is explained. The reason for using the projection method in preference to the "picking off" method is explained and may be demonstrated by having it done both ways.

Radial Line Development.

The choice of views plays a very important part in radial line development, especially in the development of the pattern for square hexagonal and octagonal pyramids or cones with a part cut away. The true length of some of these lines cannot be shown but must be found; therefore much stress is laid on teaching true lengths in conic sections. The problems suggested for this unit are P-30 through P-33, Chart 3.

Radial Line Intersections and Developments.

The intersection of cylinders by cones, cones by cylinders, and cones by cones is very common in blow and exhaust piping and a thorough knowledge of true lengths in conic sections and projections of sectional views of same is necessary to develop patterns for them. Some of the above require a well-developed power of



visualization as well as skill and accuracy. The problems suggested for this work are P-25-34-35, Chart 3.

No better lesson can be given to aid in the explanation of the above problems than the projections of conical sections, scalene cones and auxiliary views of same. The problems suggested for this work are P-32-36, (with variations) Chart 3.

Tracing and Blueprinting.

The last three weeks of the year are given to making tracings and blueprints of typical drawings and developments. These are kept as a record of the ground covered by the class throughout the course.

The use of the inking instruments is taught as well as the routine of inking any drawing and the process of blueprinting.

Throughout the entire course neatness and accuracy are insisted upon and no drawing is traced until it has been checked for these qualities as well as a general understanding of the problem. This is drilled into the students and furnishes an incentive for them to do their best.

Additional Problems.

The suggested problems will need to be supplemented for many of the more apt pupils, while some of the slower ones might experience difficulty in completing the ones on Charts 2 and 3. Some may need more problems of the same kind to help clinch the principles taught in some of the units.

Drafting Room and Shop Correlation.

In all sheet metal work each project has its individual problems, i. e.: Where is the best place to have a seam? Why? What kind of seam or joint is best? Why? How wide a seam is needed? What kind of finish if any is needed on the edges? How heavy? etc.

All these questions must be settled by the layout man before the complete pattern is developed. It is evident that to accomplish the best results there must be a close correlation between the shop and the drafting room. Trade knowledge must be taught and trade judgment and accuracy developed in both. There are also many shop kinks and short methods used in making layouts that are taught and applied after the underlying principles of each problem has been fully understood and applied by the pupils.

Method of Instruction.

The time-worn method of teaching sheet metal drafting by means of copying drawing plates worked up by the instructor has been discontinued as it was not at all thought-provoking and eliminated all chances for developing initiative.

To avoid copying and to provoke thought a series of problem sheets is arranged from which those shown on Charts 2 and 3 were selected. The students receive these problems on 4″x6″ blue prints and work their own development after the new principles involved have been demonstrated on the blackboard. Individual instruction is given whereever necessary but in no case are drawings made for the students and *no copy work* is our slogan.

Lest We Forget

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NOWHERE in recent years has so much interest been displayed in any field of thought as in that of education. The war, of course, has caused much consideration and people's minds are working on a more critical basis. New methods, new studies, and new demands perhaps, have in many cases, brought about charges of inefficiency which have put education under fire. Popular magazines have even taken a hand in discussing the general disturbance created by the master minds of education.

In many cases, emphasis has been on the plan and organization and has thus caused a factiousness that seriously detracts from the efficiency that is desired. New subjects have been introduced and new approaches to the older subjects have been created which have primarily been intended for the benefit of education. In most cases, education has been benefited by these new ideals but in some they have proved to be disappointments. Among the many changes that have been sought in the reorganization has been the overhauling of courses in manual training, and in some cases, even to eliminate it entirely. Often the fault has been with school administrators who were overzealous in applying certain "laws of learning," for instance, that pertaining to interest.

So much was said of the rigidity of early manual training without accompanying interest that another extreme took its place. So much was said that soon the boy's interest became the dominating principle instead of the interest of the boys. Progress was lost and the boy in the eighth grade was at liberty to make over again things that he had made in the sixth grade. Construction methods based on the best of race experience were entirely overlooked and it remained only for the boy to select the easiest type of problem, or such problem as would meet the minimum amount of energy required for a mediocre result. Next followed an extreme in inductive teaching, which completed the change; then the boy was allowed to make whatever his interest dictated, using a trial and error method with some individual instruction. No conclusions were formed and no scientific principles based on race experience were applied. After applying manual training in this form one can readily see the possible dangers. Progress has been hindered, knowledge has been scarce, expense for upkeep has been proportionately high because of added waste of material and time, and a bad name for manual training in general has been given. The teacher of the three R's cannot be blamed in criticizing the administration for spending so much in the shops and so comparatively little in other departments. A white elephant has been created that seemingly must be kept before public opinion.

Criticism has arisen questioning the value of industrial subjects. In most cases this criticism has come from those believing that academic education only should have a place in the school. But some of those might have reason to question their pupil product in their own subjects because of a tendency on the part of pupils to see some value in industrial work and consequently to take shop electives. It cannot be questioned that industrial subjects, well taught can be justified, in as high a degree as many of our old traditional subjects. There is at least some chance, should necessity arise, for the boy to enter a field of work in which he has had some training. We hear the cry that a danger lies in the fact that boys are selecting an "easy way out" and neglecting more useful work in the school. Two things can prevent it. First, educational guidance should be provided. Second, the industrial work, where it is weak, should be put on as high a plane as any other school subject with

reference to technique and preparation required for execution of high-class work. Standards and tests might be required in the shop as well as in the academic room. Many of our schools are teaching on this basis, the individual method having a natural place in the shop as well as in some of the skills of the academic room.

Let us assume that we are to retain a universal education permitting every American boy to have that education which his latent tendencies seem to require. It means, first, that our manual training in smaller schools must be recognized and taught in a more effective manner. It means that some educational guidance should be provided whereby each pupil has an opportunity to consider preparation for a life career. It means, also, that education in general shall be provided on a diagnostic basis. The present individual method provides this. It means also that industrial subjects need not specifically be taught as trades but may and should be taught for social, physiological and psychological values as well.

We need not mention trade learning, but we will consider these general educational values. It is quite agreeable that a boy should have a right to whatever kind of education he desires. It is also agreeable that we should help him to determine his natural desires. However, there is danger in many cases of misjudging natural fitness and desires and of misinterpreting only temporary fancies for these. There is, as in all things, a tendency to go to extremes and our educational process in modern education should proceed slowly. The correct emphasis in many cases seems to be to increase the child's vocational chances rather than to advance his education whenever possible. The question of the distinct vocational high school may arise here and unless we carefully prepare our curricula for general purposes such as social, physical and civic betterment in such special schools, we shall not provide the education that every citizen of America should have.

In our general curriculum, however, let us not feel that liberal arts should be the all-important feature. Suppose a background of shop and laboratory courses were offered, so that every boy had a chance to learn to do well those things that every man should know about a home; also, so that every boy had a chance simultaneously to come in contact with different trades, not to train him in a specific trade but to give him a general training in nervous coordination by helping to train to some extent the skill of eye and hand that is often necessary in forming common judgments. With such ends in view our guidance efforts, where such programs are in effect, and our social development would be greatly strengthened.

The emphasis in psychology varies with the age and grading of our pupils. The lower grades begin with those instinctive reactions without plan or purpose. At this age the illustrative type of shop work is quite evident and necessary. Skill is not required nor will the ability of pupils permit it. A rapid change is made. A change to the realm of thought and purpose comes almost before one has determined present reactions. Sense impressions and physical experiences are not lost sight of. Pupils are advanced from grade to grade, and soon the technical and theoretical phases dominate. A wide group of activities should be included here, whereas in the following state we should find a narrowing process where specialization supplies the desire of the vocational motive. We are greatly concerned at the present time with the last two groups. Psychological procedure will be determined by the emphasis and purpose of the work. The upper grade shopwork may be fulfilling the needs of the junior high school program wherein prevocational, as well as general educational, work with vocational guidance aims will be included. With this general view of psychology we should include the laws of learning as applied to the teaching process, which it is assumed teachers of all subjects know.

The physiological phases of industrial subjects in the present day curricula cannot be questioned. Those subjects require bodily as well as mental exertion which is very desirable. We will assume, however, that hygienic conditions such as temperature and ventilation of the shop, as well as in the classroom, are considered. A temperature of about 62 degrees in a shop is very desirable because of the extra activity required compared with that in other schoolrooms. The development of visual powers often begins in the shop when more bookish types of studies fail. We might say a coordination of eye and hand takes place that other school activities fail to bring forth.

What of these phases of manual training which we desire so highly? Shall we look them over carefully, study them from the standpoint of pedagogy and then throw them into the educational wastebasket and agree that it is mere theory and go on with spasmodic efforts in our classwork? The greatest evil which hinders the progress of these phases of manual training is the so-called trial and error method of instruction. Some educators have reasoned that for inductive teaching this method is very desirable. Those who know manual training will agree that it is very wasteful in time, material and results. The immature minds are possessed of limited experiences and we must remember that it is very difficult to expect them to understand either spoken or written directions. We are dealing with concrete material. Manual training has one of its justifications in that fact. Why should it revert to abstract methods in handling such concrete material and devices? Can one imagine the results obtained in using a verbal description in teaching the squaring process? Those who have experienced it will agree that not only one demonstration but several parts of the original will be necessary to get good results in teaching even such a simple process.

The trial-and-error method involves all manner of attempts at teaching and learning. In the early grades, where illustrative work only is done, it is quite permissible to use it. In the later grades where the change of mind to a realm of thought and purpose takes place, it is necessary to teach correct tool usage and processes of construction. With the use of the trial-and-error method the wastefulness of time and material will begin. Incorrect and slovenly methods of thought and procedure also take place. Beginners in all work should be taught facts gained from race experience and the upper grammar grades determine this beginning stage. The later years of the high school where possible specialization and application of previous experiences exist, we might well consider a more inductive type of teaching.

The purpose of a demonstration is to show, by actual performance, the proper uses of tools and methods of construction. General facts are given and correct procedure shown and no more. Great confusion takes place when correlated and unrelated materials are brought in. A single fundamental procedure that is to bear immediate use only should be given. A single strong impression certainly is better than trying to give several such impressions at once. Single impressions given at intervals as needs arise would be more desirable. In teaching the squaring process it would be more desirable to teach the first three steps at the beginning of a period and to give the remaining three steps later in the same period as they are needed, rather than teach all six steps at once. Less confusion takes place by so doing. It is quite necessary that each demonstration meet the immediate needs and be properly timed. Little value would be gained by teaching today what would be used tomorrow or later. Since we are dealing with immature minds we must make our demonstration brief. Even older people find it difficult to give strict attention for long periods. Frequent short demonstrations, given briefly and directly to the point are of much greater value than elaborate, complicated demonstrations given periodically. An appeal is made to the imitative instinct and, if it is not over emphasized, it is valuable in the hands of skillful teachers. In the beginning of any art, it is most desirable to know and to understand the imitative instinct. By the foregoing, those who understand the laws of learning can readily see an application of the laws of association, of interest, and of attention.

Teachers who are using the demonstration method sometimes find difficulty in determining results. Our individual method begins as soon as the demonstration is over. The teacher should begin immediately to correct errors in execution and to give individual demonstrations where necessary. In many cases a general weakness may be observed and an immediate assembly of the class would aid greatly in emphasizing the point in question. A teacher who is consistent in checking up on demonstrations will invariably have good results. The weaker pupils are soon singled out and given proper attention and the stronger ones are allowed to go ahead perhaps on a more inductive plan and carrying on more difficult work which involves the same constructions which are in use by the class.

It is highly important at this stage to mention the necessity of good technique in execution by the instructor. We shall assume that teaching technique is mastered, but nothing would be gained by one who has teaching technique but no technique in execution, not mentioning one who knows nothing whatever of the subject to be taught. If the teacher is unskilful in execution of work in demonstrations one can readily expect worse results from the pupils. Even were we to adhere to a trial-and-error method of teaching, sane conclusions and some individual instruction would require skill in technique of execution. It might be necessary for the instructor to carefully rehearse the demonstration or practice on weak points in execution for such ability to execute will inspire respect and confidence of the class. The task should appear easy and not difficult, being free from false motions and ineffective strokes. Skill practised with the ease and care of a master will be an inspiration to all pupils. This can scarcely be replaced by other teaching devices. Apologetic explanations resulting from unsatisfactory execution, false and ineffective strokes, and often accidents, are sure to lead to all manner of such apologies and explanations on the part of the pupils in later work.

It can readily be seen that haphazard manual training does not follow the psychological development of the child and that instructional progress does not take place. We can also see that for physiological and for social purposes, which have been mentioned in the foregoing, little is gained. If just common exercise is desired we might better have the boys get into the fresh air for physical education. This would be cheaper and more effective. But, if for better coordination of eye and hand and for more effective and concrete illustrations than some classrooms can provide for some types of pupils, the shop can readily be of service when well organized and on a sound teaching basis. For social values, our disrupted classroom organization based on trial and error causes a lack of those things that are necessary for every man to know about a home and the knowledge required in forming ordinary judgments in industrial fields. The phases of this work which have been mentioned are old things; to many they appear quite new; to others they are old in new ways. Many have forgotten them, but let it not be forgotten that our whole structure of manual training will retain its success only by keeping these necessary phases before us.

Federal Aid for Hawaii. Federal educational aid for the Island of Hawaii is to be obtained at the next session of the United States Congress following united efforts on the part of the school and governing authorities of the Island and the United States representatives. Everyone interested in the progress of education in the Island was agreed that federal aid should be given and it is only a question of time before the matter will be satisfactorily adjusted.

Standards in Mechanical Drawing

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(Concluded from April)

If mechanical drawing is to be considered as a descriptive language, the two important considerations are the shape of an object or construction, and its size. The elements of mechanical drawing when systematically arranged, fall naturally into grand divisions as follows:

1. *The uses of the instruments, materials, etc.*—The actual handling of the instruments can best be taught by careful individual instruction of each student, after which false or awkward motions should be immediately corrected. Problems should be arranged to bring out the use of each of the various tools and materials in a progressive manner.

2. *The elements of shape description.*—In this division orthographic projection must be adequately treated as the basis for shape description. The method of obtaining an orthographic view should be carefully demonstrated and followed by its application to the three planes of projection and the third angle. The ability to think in three dimensions, to get a clear conception of surfaces variously arranged with respect to one another and their position in space, presents difficulties for the pupil not always realized by the teacher. The apparent simplicity of orthographic projection when applied to a single rectangular block is deceptive. For this reason a nice balance of theoretical and practical subjects is necessary in order to secure the proper training.

As to problems for shape study, the progression should be—drawing from models, from pictorial views, supplying missing views or other views and from verbal description. Type solids can be used to a limited extent, but real things should predominate. Much of the study of shapes may be done by freehand sketches in order to save time.

Shape description includes the representation and visualization of elementary solids and their various combinations in their usual positions; a clear understanding of the use and meaning of dotted lines, cutting planes and other conventions. The number and choice of views, as well as their arrangement, should be studied and analyzed. Problems should be selected which will cover these points and in such a way that there will be an easy transition from one to the other until the subject as a whole is worked out.

3. *The elements of size definition.*—There is a certain lack of definiteness in the subject of dimensioning which causes it to be neglected as a grand division of mechanical drawing. It is generally treated by giving a list of rules without a complete exposition of the rules and their application. This subject should be classified as completely as orthographic projection, and problems in dimensioning should be given to illustrate the elements. From the sizing of simple objects the problems should lead to combinations, with an orderly procedure of work. The systems of dimensioning should be taken up and advantages and disadvantages discussed. Dimensioning should be applied to wood, castings, forgings, and sheet metal. At the same time the machines used in the industries should be described, and the operations which are performed on them with the materials used for different purposes should be explained. This is just as necessary for the making of intelligent drawings as for shop courses.

4. *The application of the preceding divisions to practical drafting.*—This division includes various working drawings, detail and assembly drawings and their relation to each other.

Intersections, developments, cams, gears, and similar position and area problems can be taught and understood best after the elements of space and size description have been thoroughly mastered.

In preparing a course in mechanical drawing the teacher should bear in mind that he is beginning a subject of unlimited scope and should seek an outline having as logical and definite a sequence of divisions as any other subject. The initial enthusiasm of the pupil should be utilized and a feeling of respect for, and appreciation of, the wonderful possibilities of the graphic language should be developed as early as possible.

Teaching standards of mechanical drawing teachers form an important consideration in the study of this subject as a fundamental secondary school course. Any teacher, to be successful, must have an interest in the welfare of others and an interest in the subject being taught. He must have a sense of values of the important divisions of his subject and understand its relation to other branches of knowledge and to life.

Methods of teaching will vary in detail for the personality of the teacher must always be an important factor. Teachers of mechanical drawing are realizing more and more the magnitude of their subject and its inter-relation with other subjects. That the subject is a most difficult one to teach properly is not always recognized. The teacher of mechanical drawing should have a thorough training in his subject, both in theory and practice, and in the methods of teaching it, together with a study of its educational possibilities. In addition he should have a well rounded general education and an appreciation of the value of other courses of study in the curriculum.

The relative worth of different subjects cannot be settled upon an arbitrary standard, yet there are people who hold that this study or that one is unworthy of one's time and energy.

True education must supply man's present needs. These needs are not alone physical but mental, esthetic, and religious. There are higher needs and lower needs. Training of the mind alone or of the hands alone is not education. We need some studies which do one, some which do the other, and some which do both. This last important class is where mechanical drawing belongs. It is one of the comparatively few subjects which develops the ability to think, the ability to see, the ability to imagine, and the ability to do.

This, then, is the status which mechanical drawing should occupy. Unfortunately, it has not reached this position as yet. A true appreciation, a thorough knowledge and understanding and a real respect upon the part of the teacher will do much to place the subject where it belongs.

In an article of this character the practical problem of outlining a course in mechanical drawing must necessarily be treated in a somewhat general way. Each course must be designed with known local factors in mind. The planning is a matter of very great importance and should not be left to chance or worked out from day to day. In a city or town the general outline should be worked out by all the teachers together. The details may vary, but the extent of the subject covered and the results to be attained should be the same for all classes of a given grade. Moreover, the course should be planned as a part of a continuous subject extending from the seventh grade through the high school. It is neither necessary nor desirable for the high school teachers to plan the work for the grade schools. All the teachers of the subject should meet upon a basis of equality and together plan the content and relation of the several separate courses.

Each part of every course in mechanical drawing should be analyzed with the following considerations in mind:

Purpose.
Methods of Presentation.
Methods of Solution.
Results.

Some of the considerations which should be in mind are listed below. These may well be used as subjects for discussions by committees of teachers of mechanical drawing:

The purpose of the course.
The makeup of the course.
Relation of subject-matter to age and environment of students.
The selection of problems.
The presentation of problems.
Checking methods of solution.
Recitations and examinations.
Grading and recording.
Selection of materials, instruments, etc.
Uses of mechanical drawings.
Duplicating machines and methods.
The literature of the subject.

By way of standardizing courses, three items of prominence are the use of textbooks, recitations and examinations, and grading.

In regard to textbooks there are few educators who will deny the statement of Professor Parker that, "The use of books is a most important process in social life, and it is the most economical means of giving instruction in school." Textbooks should be used as an aid, not as a substitute for the teacher, and the teacher should not handicap himself and his students by neglecting this very useful agency.

"A textbook should be more than a collection of problems. It should present the subject-matter in a clear, orderly, and logical arrangement of the divisions, explaining why each rule or custom is made, and illustrating wth examples representing good modern practice."

The selection of a textbook is an important matter and should receive the attention which it deserves. A book should be examined with the idea of finding out what it can be used for. Is it easy to read and understand? Is there too much or too little detail? Does it start at the beginnng and take up the subject so that its use can be seen? Is it dry and theoretical? Is it merely a statement of facts? Is it exact without being too lengthy or is it too brief for the average student? Does it contain what is essential for an average course or does it cover too many subjects? Does it include too much matter that is little used? Is it "scattering" or "to the point"? Is it a help to the teacher or does it attempt to take the teacher's place? Does it allow the student to think or is all the thinking done? Does it

22-23 YEAR · OHIO STATE UNIVERSITY · DEPARTMENT OF ENGINEERING DRAWING · 431 FILE NO
M. T. F DAY · NAME GEORGE SMITH · COURSE 426 · 21 TABLE
1-3 HOUR · Plates 87 SS 95 MT 86 Ex 97 Mark 91+A · 417 LOCKER

FEB MAR APR MAY JUNE

NO.	MARK	TIME HRS.	REMARKS
1			Prob. 15
2			" 33-36
3			" 39-42
4			" 55
5			" 57-60
6			" 66
7			" 71-74
8			" 80
9			Sk. Fig. 324-255
10			Sk. Prob. 153
11			Pict. Sk. Fig. 262
12			" " " 303
13			Prob 104
14			" 104-Trace

FIG. 2. STUDENT'S RECORD.

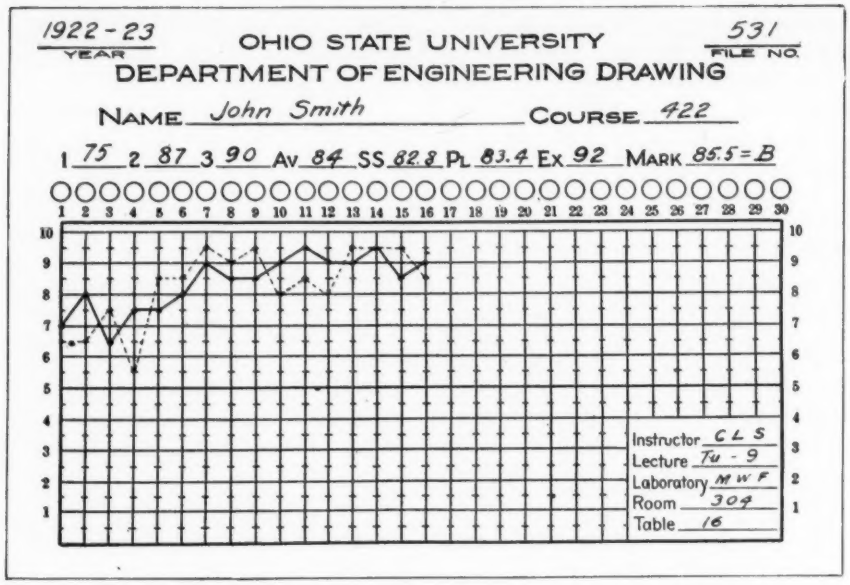


FIG. 1. GRAPHIC RECORD (See modified form for high school use below).

teach real present-day practice? Does it contain problems which are conveniently arranged for use? Do the problems fit the text? Does it contain the "why" as well as the "how" of the subject? Is it a book for the student to keep after he finishes the course?

Recitations and examinations are an effective means of testing the efficiency of the teacher's instruction and the student's understanding. The laboratory provides the valuable means of giving individual instruction and help but the examination serves to bring out the assurance or confidence of the student. Carefully checked, short examinations given at frequent intervals will form the basis of a means for clearing up many points not thoroughly understood.

The importance of thoroughly checking drawings and of some standard of grading and recording is becoming increasingly apparent to all teachers of mechanical drawing. Grading should be done as soon as a drawing is completed. The student should then be required to make the necessary alterations and corrections. A definite grade should be put on the work and the items needing attention should be specified so that the reason for the grade will be apparent to the student.

A discussion of the methods of grading and items for consideration would prove valuable for all drawing teachers and it is hoped that this paper may help to get such a discussion started. Some general items which have been used by the author are: correctness; accuracy; quality of line work; lettering, title, etc.; and dimensioning. The valuation is, of course, subject to variation for different problems. For somewhat advanced work the considerations might be: method of solution; correctness of work; character of mistakes; dimensioning, etc.; and quality of work. The use of a credit slip on which the various items are checked is a desirable way of informing a student of the basis of his grade.

For keeping records a graphical method gives satisfactory results. Two forms used at Ohio State University could be easily modified for high school use. These are shown in Figs. 1 and 2.

In conclusion, the writer would like to emphasize the desirability of a greater degree of standardization for the subject of mechanical drawing. Important standards to be considered are as follows:

The quality and quantity of work for the various courses.

The content of the various courses.

The purpose of the various courses.

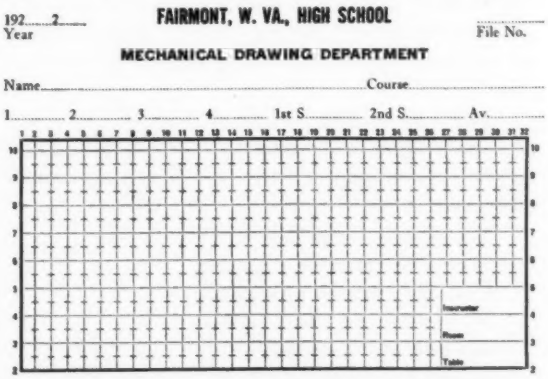
Systems of grading and recording.

Preparation of teachers.

THE GRAPH GRADING CARD.

E. J. Hawkins, Fairmount, W. Va.

The graph grading card can be used when set courses in project work are required. As an example in a mechanical drawing course, when a plate is finished and has been



approved by the instructor, it is graded and the grade recorded on the Graph Card. The curve on the graph card clearly shows the student that he is, or is not, progressing in his course.

A PLAN FOR REDUCING THE NECESSARY EQUIPMENT FOR A TRYOUT SYSTEM OF INDUSTRIAL WORK.

E. M. Wyatt, Dallas, Tex.

THE method of permitting students to go through a period of trying themselves out in various occupations as a method of vocational guidance is of especial interest to industrial-arts teachers. It is in their shops that this work should be done.

As worked out in the larger junior high schools, a number of shops—eight seems to be quite generally accepted as the proper number—are equipped each for teaching a separate trade. A skilled workman of the corresponding trade is in charge of each shop. Students are rotated through these shops, a half semester in a shop, so that at the end of a two-year tryout period, they have "sampled" eight industrial occupations.

In smaller schools compromises have had to be made as to the number of shops and the number of subjects in which a teacher must specialize and teach. In real small schools one teacher, of necessity a Jack-of-all-trades, tries, to teach all of the trades possible in an all-purpose shop. It is easy to imagine that in a school large enough that can afford to set aside eight shops and eight specialist teachers for this work, that the plan would work like clockwork and with clocklike efficiency. But like trying to do with fewer than the standard number of wheels in a clock, when you begin to cut down on the standard number of shops and teachers, it works poorly or not at all.

The subjects which have been most widely used are architectural and mechanical drawing, printing, sheet metal, bench metal work, pipe fitting, photography, electricity, concrete, forging, bookbinding, painting and interior decorating, and carpentry and cabinet making.

Such is the scheme of tryout vocational guidance as it is generally thought of and as it is here and there being worked at. The theory of it is all right and generally accepted by educators—but, alas, the ponderous machinery it takes to run it makes it impractical to run such a system in any but the very largest schools. As a result acceptance in practice is lagging far behind acceptance in theory.

If this tryout plan of industrial education is to come into general acceptance in practise, a way must be found for operating it in a less unwieldy and expensive manner, and in a school system where the schools are comparatively small.

The author wishes to suggest a modification of what might be called the standard scheme that should show a practical way of putting it into force in many school systems without leaving out some of the "wheels."

As he plans it out, it can be used in a school system, where the tryout industrial work would be given in the two upper years of the grammar grades and where ordinarily each grammar school would have but one manual training shop; or it could be given during the first years of high school in a system having several high schools. The only requirement would be that wherever it is given that the school system have for the grades in which the tryout work is given, the standard number of eight shops.

The plan the author wishes to suggest is that instead of rotating the student from shop to shop at the end of each tryout period, that the equipments and teachers be rotated instead.

In a system where grammar schools are each equipped with one shop apiece, eight schools should be grouped together and each equipped with a different equipment—woodwork, sheet metal, drafting, etc. These equipments should be selected and planned so as to permit of easy transfer from school to school. During a tryout period all the students at a school would "sample" the trade for which their shop was at that time equipped. As all would be doing the same work there would be no necessity of keeping the students grouped by grades. At the end of a tryout period all of these equipments would be moved or rotated to another school. The students at each school would then "sample" a new trade. At the end of the two-year tryout period every student would have sampled all eight trades.

In a large school system where the tryout work is done in several junior or "regular" high schools, schools having an aggregate of eight shops would be grouped into a tryout group. It would be entirely practical to group three high schools equipped respectively with one, three and four shops each. But at the end of each tryout period each school would change a shop equipment and a teacher. In the school having four shops, an equipment would remain there for four tryout periods, while in the school having but one shop, an equipment would remain at the school one tryout period only.

The task of transferring eight equipments from school to school all at the same time will on first thought seem to be impractical. Just study that feature a little and see if it would be so much of a task. In the first place the benches would not have to be moved for a woodwork bench would be just as usable for one of these occupations as for another. That leaves only the tools and machinery to move. Now, remember that we will be teaching but one-fourth year's work in each of these occupations instead of the usual one or two years given in our "regular" manual training work, and we will see that there will be less equipment to move than we now put in a shop—certainly there will be little but hand tools to move. If any machinery is in such an equipment it should be very light and selected with a thought as to its being easily transferred. It should be individual motor-driven with motors suitable for attaching directly to the electric light sockets. Each tool cabinet would be made to hold all the tools belonging to a particular equipment. These cabinets full of tools would usually be all that would have to be moved except the teachers. That doesn't seem so impractical, does it? Of course, in a system where some of the individual schools are large enough to have two or three shops each, as will frequently be the case where the work is given in high schools there will not be eight equipments to move. For the sake of school systems where eight shops cannot be conveniently grouped together it should be pointed out that six, nine or even four might be a more convenient grouping number for use in some cases.

The advantages of a system of tryout work made possible by such a scheme of rotation of equipments, over our prevalent or traditional manual training work are these:

1. The making possible in the average city school system of a tryout form of vocational guidance—giving the boy a background of experiences in various occupations as an aid to him in choosing his life vocation.

2. The enrichment of the content of the industrial work. Certainly he would get more from his shopwork from the standpoints for which we now give manual training, if he got his training in working with eight kinds of equipments and with eight instructors each a specialist in his trade.

3. It would require less for equipments than under the present prevalent system where each school is equipped to teach from one to three years' work. Under the tryout system each equipment would be for teaching but one-fourth year's work.

4. In many schools there would be an administrative advantage in that there would be no necessity of programing shop classes by grades. As all students at a school would be doing the same work during a particular tryout period, beginning students could take shopwork with the advanced students without the slightest inconvenience.

This scheme for putting across a tryout system is not by any means a cure-all remedy for doctoring our educational undernourishment in the matter of vocational guidance. It is offered, however, not as a remedy but as a suggestion of an easy way to give the medicine.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN

Editors

EDITORIAL

ECONOMY.

A national committee of educational experts makes the discovery that the only way to bring our school expenses within our available funds is to eliminate vocational instruction.

We recall that but a few years ago there was great opposition on the part of educational experts to legislation directed to establish vocational schools independent of the public schools.

We also recall opposition to federal aid for public schools.

Both of these oppositions were well taken but the definition of vocational education is yet undecided.

We believe that school training directed to vocational ends can hardly be distinguished from school training directed to broadly educational purpose. Normal schools are clearly both.

The larger part of college training is clearly vocational.

The majority of college students go to college for training that is directed toward making a living and not with the purpose of becoming scholarly. The question of educational values is not clearly established between the academic and technical school subjects. If the state is unable to pay the bills as the schools are now organized it is logical that school work which can not show greatest benefit to the state should be dropped.

The decision can not be made sensibly on lines of vocational and academic work. How can it be made?

HEAD AND HANDS.

A great sculptor tells us that the advice of American parents and teachers sounds to him like "Develop your head Johnny so that you will not need to work with your hands."

He might state with equal assurance that art teachers reverse this advice and impress on Johnny the need of dexterity without mental development.

Our public schools impress the need of mental exercise and development but neglect manual development except in athletics.

Our art schools develop the hands but neglect the head.

The industrial arts represent the desirable combination.

SHOULD THE SCHOOL DEVELOP ARTISTS?

Some school folks use strange logic in arriving at the conclusion that the schools may not take part in the development of professional artists. Of course no professional standards can be reached in common school instruction. Professional standards are rarely reached in college training. The reason is given by the evidence of professional people in the statement that it takes a life time to develop professional skill. There is not time in the school years to learn the technical requirements of any profession.

Art is the only profession which is not commonly college taught.

Art schools have negligible entrance requirements. Drawing, painting, modeling are practiced as a means of expression, by youthful persons who rarely have anything to express and who are led to believe that ultimate success in art depends on talents which they have been encouraged to think they possess because they have shown ability in drawing or modeling or painting. That drawing, modeling and painting are not evidence of artistic ability, or talent for art is rarely questioned, yet the accomplished draftsmen, modelers and painters who have no artistic conceptions or expressions are doing the hack work of industry for which their skill is required. Is it not high time for teachers who are responsible for the encouragement of children to take up art as a profession on the meagre evidence of a little skill in drawing to raise their standards of art?

In a review of the great artists and their work it is evident that a distinctive art is the product of a distinctive intellect.

The time is passing when professional men or women are pointed out as self made; self trained; without college training. The advantage of college training is now considered necessary to all of the professions excepting the profession of art. Our artists and our arts need intellectual and emotional qualities even more than they need technical proficiency.

TAKE ADVANTAGE OF THE SEASON.

Lives there a man, woman or child who does not respond to the reviving influence of the season which revives all forms of life? The teacher who is unable to take some advantage of the season by getting a more wholesome and lively response from pupils as Spring approaches, must be going into decline.

Spring and morning are confused in the arts because they are alike, optimistic. To enjoy them one must rise early and anticipate. Look up and forward. Breathe deeply and quicken the circulation.

Among the early graders the Spring festival or pageant has become a fixture. One principal of a grade school recently asked for a vote on omitting the Spring pageant which had been given for some years. The vote for a continuation of the custom was so decisive that the principal was forced to defend herself against the charge of originating the thought of omitting a performance which had become so successful a part of the school work.

The planning and rehearsing of such seasonal performances involve much work on the part of teachers but the results are saving the schools from the dead monotony of routine school exercises and enriching the lives of countless children who would otherwise have no such diversion.

With the advanced grades the Spring urge may result in distractions from study but will add to the energy and life of school work if the teachers take advantage of the season. We may be ultra modern and have too many diversions from assigned lessons but we can not return to the formalities of the old-time school. The only remedy for too many diversions is well directed diversion. School is no longer a place where children are confined with the sages. There is little cultural value in knowing what the Greeks did and thought concerning their beloved Flora unless we are led to follow their example by expressing our own emotions in our own way.

The arts offer every opportunity for this expression. Music, drama, design, dancing are all reflected in the well devised Spring festival and every interest of the school may be brought into the occasion. Let us reflect with sadness on the many poor deluded rich folks who, back to a meaningless Spring. We have the advantage having spent the winter in a summer setting, are coming of the season.

MANUAL TRAINING AND THE WOOD-SHOP.

Not many years ago manual training at best was well done wood-shop work. We recall attending a manual training teachers' meeting in a progressive community where a speaker was ruled out of order and reason for suggesting that students should work in a variety of materials and do a little design in each.

Manual training has changed somewhat in both theory and practice but it is evident from recent reports that change in practise has not kept pace with theory or with change in trade and industry.

As conducted in over two hundred high schools in one state the manual training consists of an average of less than fourteen per cent of time spent in other than wood-shop work. If manual training has the objective not generally conceded—"giving information and experience relative to typical trades and industries;" the subject needs general revision as taught. The trades and industries have changed in practice and have multiplied beyond the knowledge of the layman. The boy in school should be given some understanding of these changes with study of their causes and effects.

It is idle for manual training teachers to persist with wood-shop work only and hope to support the subject as a necessary part of the school program. The objection raised by the wood-shop teacher to work in a variety of materials is that skill is not acquired in any one kind of work and the boy becomes an indifferent tinker. The wood-shop teacher should be reminded that neither trade-skill or tinkering can result from a course of study directed to give critical experience in trade and industry. The wood-shop teacher should also be reminded that skill in one material is of less educational importance than understanding of trade and industrial interests.

Even a change of name for manual training is becoming an old issue. The subject can hardly persist as wood-shop work whatever it may be called.

NEGATIVE GUIDANCE.

One of the disturbing things that the schools encounter in their vocational guidance work is the fact that after boys and girls take all the schools have to offer in the way of advisement and foretaste courses, they often go out and seek employment entirely outside the range of their school experiences.

In one way this may be considered as a continuation of the sampling or guidance program. Or it may be interpreted to mean that the lines of work which such students sampled in school proved to be unsuited to their tastes or abilities. It is quite an achievement to steer one away from the task for which, as a life job, he is unsuited.

About all that counts, however, in dealing with the temporary, vacation job is whether the students have a definite plan, a forward-looking program into which their vacation jobs fit; or whether they are just making "spending money." If the summer job in any way helps a student toward a worthy goal, it is very much worth while. The vocational adviser should not be alarmed at any turn which the summer jobs may take, unless they result in dissipated time, energy, and money.

The imagination is active in every rational movement. The architect in planning a building sees it all before a brick is laid or a nail driven. The inventor conceives an end to be reached, and then constructs a device to achieve the desired result. The general makes his plan of campaign before giving a single order to his troops. The farmer sows his seed in the autumn for the harvest to be reaped the coming summer. The young man chooses his vocation in view of anticipated results to be attained fifty years hence.

We are all the time reaching out beyond the present. This is involved in a life governed by motives. We picture the future and prepare for it. The years to come rise up before us, and we make our plans to fill this picture with concrete experiences. In the very simplest things imagination is employed—in the order the housewife makes for the dinner; in calling on the grocer for a pound of tea; in constructing steps for entrance at the door of our dwelling. Something comes up before the mind, is there imaged, before acts are performed.—*Lewis Ransom Fiske.*

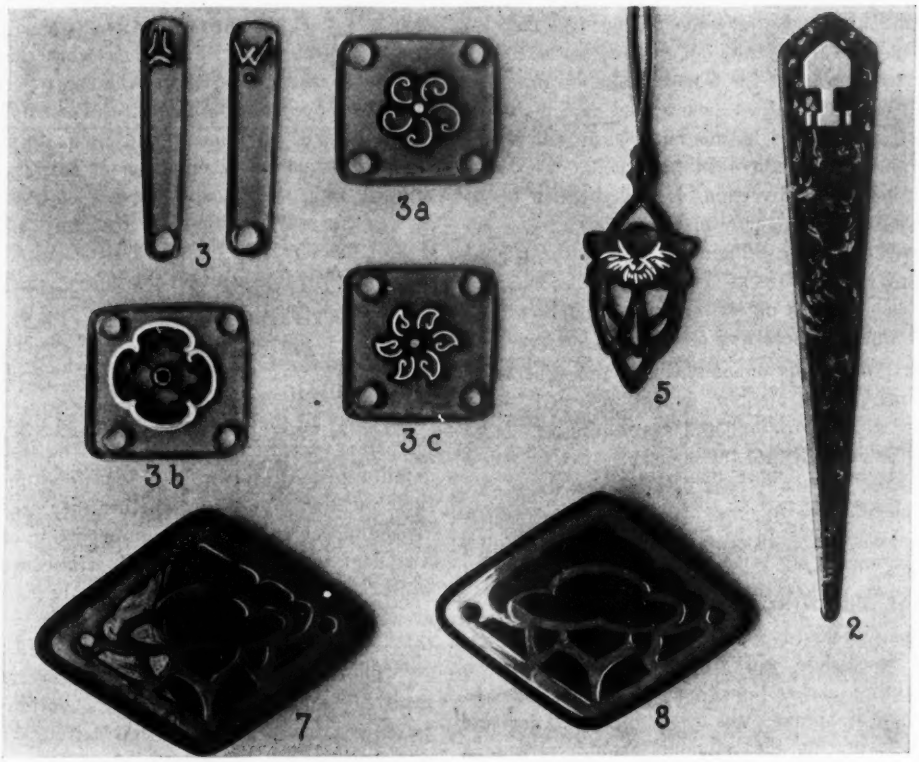
The sun illuminates the hills while it is still below the horizon; and truth is discovered by the highest minds a little before it becomes manifest to the multitude. This is the extent of their superiority. They are the first to catch and reflect a light, which, with their assistance, must, in a short time, be visible to those who lie beneath them.

—*Macaulay.*

An originator of opinion precedes the time; you cannot both precede and reflect it; what ten years ago was philosophy is now opinion.—Bulwer.

The greatest events of an age are its best thoughts; it is the nature of thought to find its way into action.—Bovee.

Talking is like playing on the harp; there is as much in laying the hands on the strings to stop their vibrations as in twanging them to bring out their music.—O W. Holmes.



2—PAPER CUTTER. 3-3A-3B-3C—GIRDLE ORNAMENTS. 5—PENDANT. 7, 8—BROOCHES.

An Interesting New Craft for the Grades

Gertrude S. Twichell, Boston.

A FEW years ago, a new form of craft work was discovered by occupational workers, and this has been used with much success in rehabilitation work in hospitals in different parts of the country. The material used is celluloid, altho various trade names such as ivorene, ivoroid, fiberloid and others are now preferred. Formerly the material was hard to get except in very large sheets which were expensive and hard to handle. Now it may be obtained in sets or in small lots and in various forms such as thick and thin sheets, rods, tubes and blocks of convenient sizes and shapes. Cement for use with this material is supplied with the sets, or may be purchased at artists's supply houses. This work is not expensive, is not hard to learn, and the varied colors in plain and mottled effects make it very fascinating, especially to the grade pupils. For the upper grades and high schools, it now offers a splendid medium for the working out of problems in design and color, where more delicate and complicated pieces may be worked out.

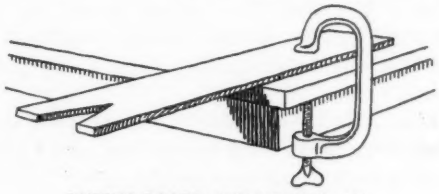
Besides the material in various forms and the cement, the equipment needed is small. Many problems may be worked out with simply scissors or a sharp knife, while others require a few more tools, such as a saw, drills, sandpaper and possibly one or two other materials which are neither expensive nor hard to find.

Any small saw such as is used in light wood toy-making may be used, but the best for the purpose is a regular jeweler's saw-frame, with jeweler's saw-blades to fit. Nos. 2 and 3 are convenient sizes with which to work. Care should be taken to have the saw-blades properly placed in the frames. Fasten the top of the blade in the upper slot of the frame, having the teeth of the blade pointing downward, and turn the thumb-screw tight. Press the top of the frame against the bench and the end of the handle against the body. A slight pressure will spring the frame so that the sawblade will go down into the lower slot, and may be fastened tightly with the thumb-screw. When the pressure is withdrawn the spring of the frame will pull the blade tight, thus reducing the liability of breaking the blade at the first attempts to use it.

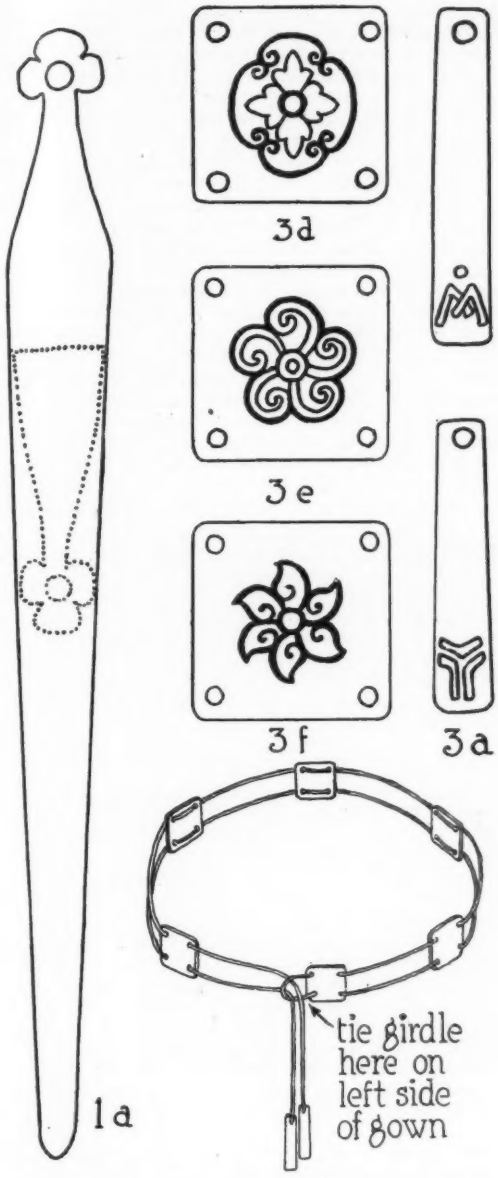
A saw-board is necessary for good work. This is a board about one-half inch thick, two and one-half or three inches in width and ten or twelve inches in length. In one end of the board, a V-shaped notch is cut, extending in about two inches, and being about an inch or an inch and a half at the wide part. This board may be clamped or screwed to the bench or table, the notched end extending beyond the edge. The material is held firmly in position on this board, using the left hand, while the sawing is done with the saw held in the right hand, the saw-blade working straight up and down in the V-shaped notch. A very slight forward and downward pressure should be used.

Several sheets of fine and very fine sandpaper are needed to finish edges after cutting or sawing. If one has coarse and medium half-round and flat needle files, they will be very convenient in finishing pierced work.

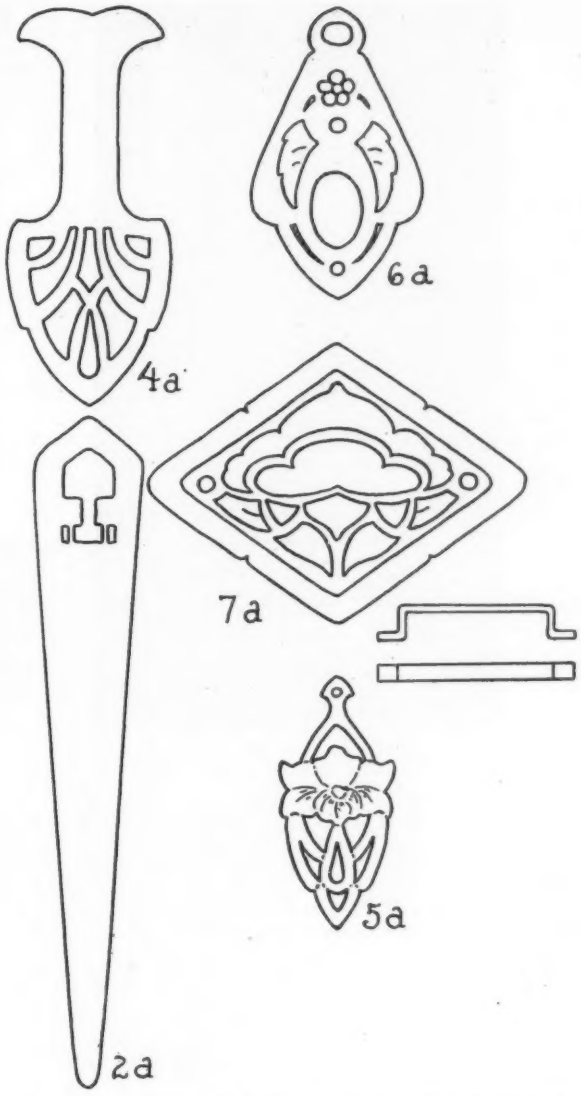
Articles are finished or polished by dipping in glacial acetic acid, which may be purchased at the local drug-store. There is no danger in using the acid if care is taken not to get it on the skin, and to wash it off at once



SAWING BOARD AND METHOD OF FASTENING TO TABLE.



1A—PAPER CUTTER. 3A-D-E-F—GIRDLE ORNAMENTS (FULL SIZE).



2A—PAPER CUTTER (HALF SIZE). 4A—NAPKIN RING (HALF SIZE). 5A—PENDANT. 6A—PENDANT. 7A—DRESS ORNAMENT.

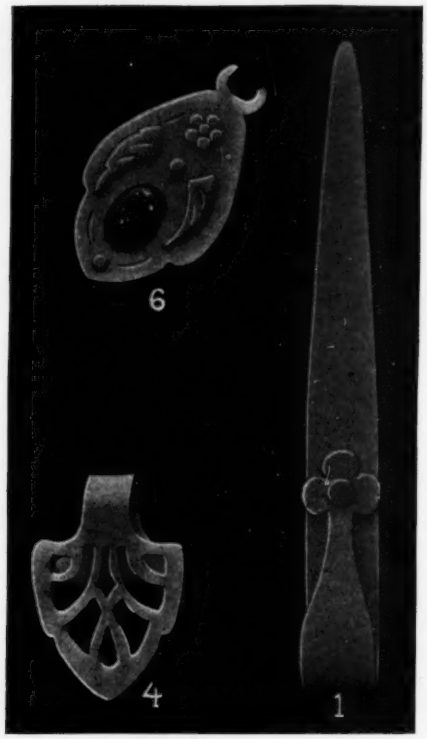
if any does come in contact. Rubber gloves, of course, are the best way of preventing roughening of the fingers. Articles should always be dipped into the acid with the aid of a thread or fine wire attached to them. If possible have acid in a glass receptacle which is large enough to allow articles to be completely covered at once, so as to avoid handling or turning with fingers or tweezers. After dipping, hang articles up to dry, carefully absorbing any drops which may collect at edges or openings by touching them with the corner of a cloth or blotter. The acid gives a smooth glazed finish and will take out any scratches that are not too deep.

Always use fresh acid, keeping the articles until there are a number to be finished and doing this part all at once. Have the acid in a room of ordinary warm temperature, as very cold air causes it to crystallize, and this means leaving it in a warm room until it liquifies again. Clean off any pencil, finger or similar marks, using soap and water, rinse and dry thoroly before giving the acid finish. Many articles can be so carefully worked out that the acid finish will not be necessary.

A drill is very useful for making perfectly round holes, but pointed scissors or a very small knife-blade may be used. Engraving tools, if one has the U and V shapes, are useful, altho if necessary one can get the engraved effect by scraping carefully with a sharp knife.

Designs may be drawn on light-colored material with pencil or traced with carbon or transfer paper, or by a rubbed pencil tracing. On the darker colors it may be necessary to scratch on the design with a metal point such as a compass-leg or scratch-awl. Pierced designs may have a pencil tracing pasted to the material and the sawing done thru both paper and material.

Material may be bent and shaped by placing in hot water for a few moments and bending with the fingers. Keep softening it in the water and bending until the desired shape is obtained, then still holding in shape, dip quickly in very cold water for a minute. This will stiffen it at once. *Be sure there is no open fire or flame near*



1—PAPER CUTTER. 4—NAPKIN HOLDER.
6—PENDANT.

where you are working—heat the water in another room if possible. Be careful also about the filings and scraps —keep them together in a box and have the janitor dispose of them.

The illustrations show a number of articles which can be made in the grades, and similar ideas can be readily worked out, fitting the problems to the particular class taking the work. First of all, of course, the design must be thought out, and the color, size, shape, thickness of material, usefulness and other usual questions must be taken into consideration. Careful drawings and tracings of the designs will be necessary, and will probably form one or two preliminary lessons. Full size outline patterns of these illustrated designs are shown as suggestions.

The two paper knives or letter openers are the simplest of problems. These require the use of the saw or sharp knife and the cement. The longer opener, Figs. 1, 1a, which is of ivory, is sawed out, edges sandpapered and bevelled, and the lower part of the blade sandpapered thin enough to open envelopes. The round spot in the center of the three petals is a one-sixteenth inch "slice" cut or sawed from a one-eighth inch rod, and cemented in place. The opener is bent and shaped as described above, using the hot and cold water. If care is taken it may not be necessary to use the acid for finishing. The shorter opener Figs. 2, 2a, is of a beautiful jade mottled tone. The conventional tree design is cut out of thinner ivory and cemented in place. Dry the articles for about an hour after cementing before sanding and polishing. Sandpaper this opener also at the lower part of the blade, so that it will open envelopes etc.

The girdle (Figs. 3, 3a, 3b, 3c, 3d, 3e, 3f, 3g,) offers a chance for much originality, and will appeal, of course, more especially to the girls, altho the same idea may be worked out as watch-fobs for the boys, using single medallions and making a slot at the top through which to run the ribbon or leather, and omitting the round holes used for the girdle. Heavy amber material was used for this particular model, the holes being made with a large drill. The designs, adaped from the Japanese, were painted with black and gold enamel paints. Rounded corners were sandpapered or filed smooth. Much care must be taken in sawing out the medallions to get them perfectly symmetrical, and the holes accurately placed. If the acid polish is given, dry the articles over night, before doing the painting. Connect the medallions with matching or contrasting ribbon or heavy cord. Dark blue medallions with a painted Persian design made a beautiful girdle.

The ivory napkin clip (Figs. 4, 4a,) gives a splendid opportunity for working out a good conventional design or a monogram. First paste a careful tracing to the ivory. The outline is next sawed out. Then holes are drilled in all openings in the design, and these openings are sawed or cut out. Finish with fine files or sandpaper, then bend to shape as illustrated.

The pendant (Figs. 5, 5a,) is simple amber material sawed, tooled and carefully finished. The other pendant (Figs. 6, 6a,) is somewhat more complicated. The back must first be sawed out of ivory. The flower form is made by sawing off one-sixteenth-inch sections of small ivory rod, and cementing these together before cementing to the back. The leaves are similarly cut out of heavy ivory stock, and modelled to shape with file or knife and sandpaper. The oval is of jade material sanded to a smooth jewel-like contour. The other two circular pieces are single sections of the ivory rod. The lines are engraved or carved. Other combinations such as ivory motifs on a jade background may be worked out, or the entire pendant may be kept in one material alone. Hang the pendant on a cord or narrow grosgrain ribbon.

The dress ornament or buckle presents perhaps the most difficult problem of this group. The background shape is of medium heavy material, with two or three colors cut out and overlayed on this. In the one illustrated (Figs. 7, 7a,) the upper layer was of thin material, soft gray in color. The design was cut out of this with a sharp knife, the cut-out portions being saved and used for a second buckle! Under this gray is another thin sheet, this time of green. Back of the green at the top, is a piece of brilliant pink, which shows only as a soft rose under the other color. Under the lower part of the design is placed a piece of brilliant red, which shows thru as a darker tone of the rose! In certain lights, there is a beautiful green glow over portions of the design which makes it very charming. Black dots are painted on to add interest. The background is of a medium blue, and this should be first cut out and slightly curved to take off the uninteresting flatness. Over this each color is laid in proper turn and very carefully cemented in place. Cut and bend strips as shown in the illustration, and cement to the back of the buckle to allow of fastening to the gown.

The cut-out pieces left from this design were carefully cemented to a sheet of soft dull yellow, (Fig. 8,) this in turn being mounted on blue, thus making two buckles from the same design with but little extra work. This method also makes it necessary to do perfect work in cutting out with the knife when making the first design, as the pieces cannot be used if cut out "any old way." Different color combinations and ways of making these will form a fascinating program for at least one session. With a little modification, this same design could be made of heavier material and pierced, instead of the over-and under-laying above described. The design could also be painted, using enamel colors. Making a design for a buckle or ornament to go with some particular dress is a splendid problem which will prove of real value in teaching of design as applied for a particular purpose.

From the group of articles described, the wide-awake supervisor or teacher will surely gather a host of new and interesting ideas, and she will find even more of them when once she gets some of the material and discovers the almost unlimited possibilities. Bracelets, pins, combs, boxes, trays, bag-tops, shade-pulls, and hundreds of other things will suggest themselves. I am sure she will be as much, if not more fascinated, than the pupils themselves!

Practical Manual Training Work

J. Scott Wiseman, Dillon, Mont.

WHEN the new training school building, to contain the manual training department, was planned at Dillon the board of education was requested not to provide any cabinets, bookcases, or other furniture for the manual training department. The manual training department wished to make this furniture. Therefore, at the completion of the building, in September 1921, the 8A class began the construction of these articles.

It was the aim to make these articles as a series of projects, planned by the pupils and constructed, so far as possible, according to industrial methods. In other words the need was presented to the pupils; for example, the need of a long library table that would be suitable for the primary grade library room. Then the boys worked out the proper dimensions for such a table, decided upon its design, and made a working drawing with the bill of materials and the cost of the same. Next, they took up the different problems connected with its construction. What kind of joints should be used? What part of the work should be done on machines? Where could jigs be used to advantage? What is the proper method of procedure in cutting duplicate parts on a machine? How should a machine be set for the different cuts? Of course, all these questions were not taken up at the same time, but only as they arose.

VIEW OF THE LOCKERS AND AMPHITHEATER BUILT BY BOYS.

It was the aim of the school that the boys work so far as possible according to the best methods, and under the same conditions found in industry. The instructor did not wish them, in the eighth grade where large pieces are made, to saw, plane, and chisel for weeks at a time in order to finish a small job and come to believe as a result that that is the way such things are done in life. It is a crime to waste the time of boys in unthinking, impracticable labor, especially when they can so easily utilize the situation for the cultivation of initiative, cooperation, thinking power and under conditions, too, that will give a natural, not an artificial, setting.

This decision to build the equipment in the form of projects in the best sense of that term was not the result of inspiration on the spur of the moment. For several years the manual training course of study has been designed to prepare for this work in the eighth grade. In the sixth and seventh grades and sometimes in the eighth B, the pupils select their problems, think out the dimensions, proportions, and constructions and then make freehand mechanical drawings of the problems with bills of materials and estimates of the cost. After these things have been done, they make their projects with hand tools. As a result, by the time a boy has reached the eighth grade, he has learned something about the care of edge tools, the reaction of wood to cutting tools, the common methods of constructing article in wood by the use of nails, screws, and the common glue joints, the art of drawing up plans with bill of materials and the cost of the same. Above all, the boy has had some experience in thinking out his own problems met with in the shop. Therefore, at the end of the seventh grade, or eighth B grade, he is ready to take up work with machines and, wherever possible, the production of articles in quantity.

The work with machinery should not be begun before some preliminary work has been given the sixth and seventh grades. A knowledge of such things as the mortise-and-tenon joints, the use of the dado and the rabbet, panel construction, etc., is necessary to give the boy some idea beforehand how to set the saw for the different cuts necessary to make a certain joint. Further, the boy should know something about wood cutting tools. Of course what the boy may get along this line in the sixth and seventh grades does not to a very great extent prepare him for the handling of machinery. He should get, however, a pretty clear idea of what grit and nails will do to a sharp tool, that tools to do good work must be kept sharp, that rubbing parts must be oiled frequently, a knowledge of the difference between a cross cut saw and a rip saw, etc., that will give him a background of experience helpful in the proper handling of machinery.

At the end of the seventh or eighth B grade, it is time to take a step forward. The pupil has gone as far in the work with hand tools as his educational development well warrant at this time. To go further would be objectionable for several reasons. It would mean that the pupil would, especially on the large pieces that he would undoubtedly now make, waste much valuable time in mere labor; that much of the work would be a repetition of what he has already had and, therefore, without much value

ASSEMBLING TREE GUARDS.

educationally; and, finally, that the work is likely to be so far beyond what is required with hand tools in life that it would be artificial and hence without educational value. The boy's time in school is too valuable to be spent on unprofitable activities.

The grade school shop is no place to acquire special skill in the manipulation of tools and materials. Hand tools are used to such a small extent in the working of articles of wood that the boy performs in an artificial, not a natural, setting when he works with hand tools beyond a certain point. For the same reason he should get away from the individual problem, and the hand tool idea, and construct articles in quantity with power machinery and in cooperation with others.

The work with machinery is especially valuable since it furnishes plenty of time and opportunity for new problems, requiring original thinking as in figuring out the logical order of procedure in cutting out duplicate parts, or in the planning and construction of a jig to shorten some portion of the work.

The projects made in the manual training department are as follows:

Shelving for the built-in bookcases of the new building.

One cabinet in a supervisor's office remodeled and four drawers added.

A card index file for the office.

Two birch library tables, one nine feet long for the primary library room and one four feet long for the 6A room.

Partition for a bathroom in the girl's toilet of the primary building.

Twenty-four toy animals on wagons for the kindergarten.

Seventy-eight guards for the new trees planted on the school grounds.

The projects made for the manual training department are as follows:

One bookcase for the office.

One cabinet of thirty drawers, each 6″x15″x25″ for the office.

One tool room with cabinets and a definite wall space for each tool.

Amphitheatre with cabinets for supplies built in three sides of the amphitheatre.

One cabinet of forty, panel doored lockers, each 2′ 0″ x2′ 0″x3′ 6″.

One cabinet for filing the pupils' working drawings.

One coat and hat rack for the office.

One magazine rack for the office.

The projects made during the past two years in the manual training dark room are as follows:

One 8″x10″ automatic, electric printer.

One camera for enlarging, reducing, copying, and lantern slide making.

One four feet electric printer for printing cirkut prints.

Several dark room lamps.

Three cabinets for filing negatives and storing supplies.

The photographs illustrating this article were developed and printed in the manual training dark room by the instructor and a few of his eighth grade pupils.

In making the 68 tree guards, the following outline was used:

The proper dimensions for an efficient guard.

Its design.

Bill of materials and cost.

Method of procedure in cutting duplicate parts.

Proper handling of machines in the cutting of duplicate parts.

Discussion of jigs.

Where jigs can be used in this problem to advantage.

The jig for cutting the points on the uprights.

The jig for assembling the uprights and rails.

The jig for cutting points on the uprights was an apparatus arranged on the saw bench in a sort of track so that it could be moved back and forth parallel to the saw. On this apparatus was built a kind of half-pocket in which the end of the upright was placed. This half-pocket held the stick at an angle to the saw so that, when it was pushed by the saw, one side was cut at the proper taper. To get the point on the stick, it was turned one quarter turn every time the jig was pushed past the saw until the piece was tapered on all sides. As a result all the points of the upright could be cut quickly without any measuring whatsoever.

The jig for nailing the rails to the uprights was a very simple aparatus. On a small platform blocks of wood were nailed in such a way that the uprights could be placed on this platform the exact distance apart, and at the proper slant; and the rails placed in the exact positions for nailing without any measuring being necessary.

In making these articles, every step, so far as was possible was figured out by the pupils. The actual work on the machine was, however, done in most cases by the instructor as the machinery is too dangerous for eighth grade pupils.

The steps in making the forty paneled doors were as follows: The drawings for the doors were worked out, the number of pieces of each size ascertained, and the lumber ripped and cut to proper sizes. After one face of each piece, that is of the stiles and rails, was surfaced and marked, the exact width and position of the groove for the panel was determined. The pupils next set the saw for the first cut, the cut next the unsurfaced face, and clamped down the jig in position that would press against the piece just where the saw is doing its work so that the piece at all times would be held against the ripping gauge. Then with the surfaced face always placed against the ripping gauge, the instructor ran all the pieces through the saw. The pupils acted in the meantime as assistants and observed carefully the procedure. The pupils next set the saw for the second cut, the cut next the surfaced face which gives the width of the groove, reset the jig, and the operation was repeated.

The next step was the cutting of the tenons and mortises of the slip joints. The pieces just grooved were put in two piles, the stiles on which the tenons were to be cut in one pile and the rails on which the mortises were to be cut in the other pile. In cutting the tenons and mortises on these pieces, the steps were the same as in cutting the grooves. The pieces, however, were run through the saw on end.

The panels were next cut and fitted and the doors glued up. After the glue was thoroughly dry, the doors were run through the surfacer with a light cut. It was noted that the edges of the stiles and rails that happen to be parallel with the knives of the surfacer will spilt off if too heavy a cut is taken. This edge splitting is not so likely to occur if the doors can be run through the surfacer on an angle.

The doors were then squared on the jointer, fitted to the lockers and hung.

SURFACING PANELED DOORS.

At first a little of the work was done without jigs but it soon became very evident to the boys that more accurate work could be done with the jig and done, too, more rapidly. Therefore a jig to aid in the cutting of the grooves was rigged up. To make the jig, two pieces were used. One piece was laid diagonally across the saw table. One end was clamped to the table. The other end pressed against the work to hold it firmly against the ripping gauge. To hold this piece in place, another piece at right angles to the first, was clamped to the saw table. As the second piece hit the first piece a little way from the saw, the latter was able to give enough to accommodate any variation in the widths of the pieces being run through the saw. In cutting the mortises and tenons of the slip joints, this arrangement will hardly do. A fairly flexible piece of wood, 1"x4", set on edge on the saw table and parallel to the ripping guage should first be clamped down. This stick should leave just room enough for the piece being tennoned or mortised to be pushed between it and the ripping gauge. The jig first described should next be adjusted to press against this stick at the right point.

When the doors were being squared on the jointer, a piece of timber was clamped on the outer edge of the jointer so that just enough room was left between it and the guage to allow the edge of the door to pass over the cylinder.

With the above jigs a number of the 8A boys did a large amount of the work on the machines but only when the instructor was present.

The work done by the students this year saved the board nearly $600.

SCHOOL BOARDS—WE AWAIT YOUR ACTION.

H. E. Stone.

"If every one engaged in this world's work were doing just what he was best fitted for, there would be an immense gain both in efficiency and content. Hence, many look to vocational guidance in the largest sense as the hope of the world." Thus writes G. Stanley Hall, known to educators because of his studies in adolescence, senescence, etc.

The greatest educational philosopher of this generation, John Dewey, says: "To find out what one is fitted to do and to secure an opportunity to do it is the key to happiness."

For more than a decade educators of national standing like Charles W. Eliot, Richard C. MacLaurin, E. L. Thorndike, Frank Spaulding, Paul Hanus, Herman Schneider, C. A. Prosser, Meyer Bloomfield, John Brewer, and a host of lesser lights have preached the wisdom of more educational, vocational and personal guidance in grade school, high school and university. Plato, the Greek educator and philosopher, considered it to be the business of education to discover individual aptitudes and to train them for social use.

The Grand Rapids plan of guidance is well known, likewise the Cincinnati plan, and the Erie plan. Hundreds of cities, including Pittsburgh, Detroit, Boston, and Brooklyn have made their beginnings. Stanford University through its Committee on Vocational Guidance, and Oberlin College through a similar committee, have disseminated among students reliable facts concerning occupations. Brown University and other higher institutions through orientation lectures, talks to freshmen, etc., have attacked the problem. West Virginia University, with its system of helpful supervision by class officers, and other schools in various ways have sought to guide the individual student. Deans of men, selected because of their ability to increase the "personal touch," have been assigned to the administrative staffs of more than thirty of our great Universities. Some of them give educational, vocational, and personal guidance. Most of them devote the greater part of their time to matters of attendance, discipline, social life, and other student activities not related to the selection of, and preparation for, a life career. Harvard, Columbia, The University of Chicago, and other universities have done much to train specialists in the field of guidance.

The fact remains, however, that the great mass of our young people when they enter the world of occupations have given less time to the choice of a life career than they have to the selection of clothing. To the majority who leave college the world of occupations is a "dark continent." Is it to be wondered that those who drift about wasting valuable time trying to find a suitable business occupation, not requiring capital or parental backing, and not demanding a specialized foundation in the shape of business training, often fail, and are at least for a term of years both discouraged and embittered? Is it surprising that many who, after a year or two in college, entering schools of engineering, law and medicine, do not find the work suited to their inclinations and capacities? Is it unreasonable to expect many mediocre lawyers, bungling dentists, and second rate engineers?

Comparatively few high schools and colleges in the United tates employ full-time trained specialists qualified to discuss with students promotional lines, and occupational requirements, to make job and character analyses, or to apply the well known occupational tests. As a general rule we leave our young to flounder or to trust to the mercy of those who masquerade under the title of "character analyst." Worse still, we permit them to be deluged with pseudo-guidance and mis-information. And then we wonder who so many fail in life.

The great question of this and every generation is not who should go to high school and to college, but what they should receive after they get there. The idea that they should simply be exposed to some knowledge that has been handed down from the past is fast waning. Some educators are even beginning to see the cultural in the practical and beauty in the commonplace. Many there are who believe that the first test of intelligence is discrimination and that it is not a bad sign that students are showing signs of greater powers of discrimination in the matter of the choice of studies as a foundation for life and its many obligations. Those who believe that educational and occupational direction and guidance by trained specialists should be universal are now legion.

The educators are sold on the proposition of guidance. They ask only that it shall be done by men and women of mature judgment, wide experience and sound scholarship, and that they shall be specially trained for their specific tasks. Too often, however, they await action on the part of boards of education whose members believe that Plato's doctrines are frills and fads.

How long? *OH HOW LONG!*

Standards of Measurement for Determining the Productive Value of a School Shop

James Forbes, Director, Vocational School, Southbridge, Massachusetts.

The necessity of having some definite standards of measurement for determining the productive value of a school shop, and the challenge which industry brings to our doors in the form of our neglect to teach productive methods in the schools, has induced me to select this topic only after considerable thought; not because of the divergence of opinion on this subject among teachers themselves, but rather on account of the intimate contact which it brings between the school shop and industry.

It seems to me that the question of production supplies the "missing quantity" in our school instruction which industry has looked for. Any method by which we can bring our product up to the standards demanded by industry is "justifiable" education.

We are all agreed that the school shop *can* have an organization and a management just the same as any manufacturing concern and that it *must* be run on a business basis if it is to be operated successfully.

Before commencing the manufacture of any article in the school shop, it is necessary to devote just as much thought and planning as to the advisability of doing this work as it would be if the article was to be manufactured in the regular commercial shop and placed upon the open market.

The considerations that are to be given to such work might be enumerated as follows:

1. Is the article proposed to be made of practical value? 2. Does it afford the necessary progressive training? 3. Can it be conveniently made with the equipment available?

After having decided upon the job or jobs that are to be produced in the school shop, it will be necessary to get out the drawings and patterns and to purchase the materials for the job, make out routing sheets to decide the general methods by which the work is to be handled in the shop.

There are six units embodied in the management of a manufacturing business and these are classified as follows:

1. A board of directors or planning board, who decide upon the article to be made and furnish the ways and means for producing the same.

2. An engineering department, which acts in conjunction with the planning board and furnishes the necessary drawings, designs, and specifications for making the article.

3. A purchasing department, which obtains estimates and buys materials, and guarantees shipments.

4. A manufacturing department, which produces the article or articles desired on scheduled time and at a minimum of cost.

5. A selling department, which finds a market for the articles.

6. An accounting department, which provides balance sheets and determines whether the product is being made at a profit or loss.

This is the method of procedure by which commercial articles are placed upon the market, and, it seems to me, the school shop can do no better than follow the practice of industry. It does not mean, however, that such an organization is feasible in the school shop; the whole of these units may be one teacher, or group of teachers but this will depend entirely upon the size of the school.

The accompanying chart shows a method of organization which, I believe, would be of value to the schools in standardizing their product, methods of manufacture and prevent useless duplication. While in a sense, it uses the board of education as a "clearing house," it gives the schools the benefit of a central office to turn to for information on shop management.

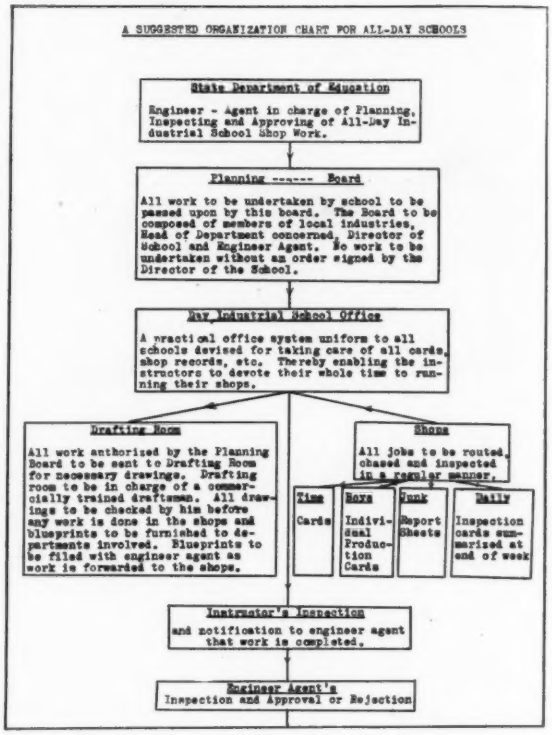

A SUGGESTED ORGANIZATION CHART FOR ALL-DAY SCHOOLS
State Department of Education
Engineer - Agent in charge of Planning, Inspecting and Approving of All-Day Industrial School Shop Work.
Planning ------ Board
All work to be undertaken by school to be passed upon by this board. The Board to be composed of members of local industries, Head of Department concerned, Director of School and Engineer Agent. No work to be undertaken without an order signed by the Director of the School.
Day Industrial School Office
A practical office system uniform to all schools devised for taking care of all cards, shop records, etc. Thereby enabling the instructors to devote their whole time to running their shops.
Drafting Room
All work authorized by the Planning Board to be sent to Drafting Room for necessary drawings. Drafting room to be in charge of a commercially trained draftsman. All drawings to be checked by him before any work is done in the shops and blueprints to be furnished to departments involved. Blueprints to be filed with engineer agent as work is forwarded to the shops.
Shops
All jobs to be routed, chased and inspected in a regular manner.
Time Cards
Boys Individual Production Cards
Punch Report Sheets
Daily Inspection cards summarized at end of week
Instructor's Inspection and notification to engineer agent that work is completed.
Engineer Agent's Inspection and Approval or Rejection

CHART 1.

The key to the whole situation (Chart No. 1) in so far as it concerns the school, lies in the production factor, since the marketing of the product rarely enters into the school problem. Consequently the question resolves itself into one in which the time element predominates, and as this largely determines the ability of industry to dispose of its products it becomes one of the vital elements of manufacturing. Consequently, since industry places such a premium upon the shoulders of production, it would seem well for the schools to train their students in appreciating the value of time in the production of work.

I believe that the schools as a whole lay but little stress on this phase of training, assuming that the ability of the student to do the job means more to him than the element of speed which they argue can be developed after the boy enters the industry.

As a matter of fact, industry is unwilling to wait for this development with the result that the boy starts to work under a handicap, becomes discouraged and quits. He thereby brings discredit on the school which might have been avoided had the school not only asked the question, Can you do the job? but also demanded, How quickly can you do it?

Idle boys like idle machinery are an expensive item in the running of a school. While they may not show up at first, eventually they become a liability of untold magnitude. I think that too little attention is given to this subject and we are more or less inclined to dismiss the matter with the resolution to plan our work in such a way as to prevent idleness in the future. Be that as it may, the fact remains, that there is food for thought in "How much are we paying for idle time in our school instruction?"

Then again, what percentage of the work done in school represents "misdirected" or is simply work given to the boy to keep him out of mischief. There are some boys who can get along and keep busy with an astonishingly small amount of work; others who work hard but spasmodically, and last of all the type we like best, but seldom meet, the *plodder*. I am, therefore, of opinion that some method must be adopted to measure the "lost time" factor in order to do justice to the boy and the school; bearing in mind of course, that there is a legitimate amount of time which must of necessity be lost so far as actual direct benefit is concerned. The tendency of the instructor is to do work himself, which the average class is perfectly willing that he should do. It requires considerable experience and self-control on the part of the teacher to avoid getting into this condition.

We are familiar with the boy, who, if given a chance, will "soldier" on the job often to the detriment of the whole class, and unless this individual is closely checked up, he will "get away" with it for a long time.

The following remarks have to do with a machinist's class in shopwork and simply present one method of checking up the individual boy and at the same time placing a direct productive value on his shopwork. It is to be understood that leeway is allowed for instruction and lost time; the main object of the investigation being to determine under what heading to charge time spent on actual productive work.

In the first place, it is necessary that the exact cost of each job, as well as a record of spoiled work, be accurately kept for the following reasons: 1. As a basis for class discussion on the relative methods of doing a particular piece of work. 2. As a stimulus to the student to devise ways and means of producing good work at minimum cost, with the least possible waste of material. 3. As an educational factor around which, in large measure, hinges the student's future success.

It is imperative that the cost of producing work in the school shop should be considered from the standpoint of how much it would cost to produce a similar piece of work in the trade. In many cases actual figures may be obtained; while in others, it will be necessary to estimate a value. It should be borne in mind, however, that these figures must represent as nearly as possible, the true value of the work, regardless of how the job is to be produced in the school shop. It will also be necessary, in order to make this comparison, to set a standard of wages for the students and the following rates are recommended:

15 cents per hour for first grade students.
20 cents per hour for second grade students.
25 cents per hour for third grade students.
30 cents per hour for fourth grade students.

In general, there are five elements entering into an analysis of the manufacturing cost of an article and these are defined as follows:

Wages: Shall represent sum of money paid to student.

Estimated Value: Shall be that figure which represents the commercial price allowed by any manufacturing concern.

Overhead: Shall represent that figure which includes the cost of power, light, heat, rental, interest and depreciation, supervision, etc., that is necessary to the running of the school.

Total Cost: Shall be the sum of wages and overhead.

School Manufacturing Efficiency: Shall be the ratio of estimated value to total cost and may be best represented as follows:

Let E = Manufacturing Efficiency.
Let V = Estimated Value.
Let C = Total Cost.

Then, $E = \frac{V}{C}$ .....%

TABLE SHOWING DISTRIBUTION OF SHOP TIME

(Expressed in Percentages)

No. of Boys	Productive	Non Productive	Instruction	Setting-Up	Lost Time
Oct. 7 Div. A 13	75	7	6	6	3
Oct. 13 Div. B 13	78.2	7.2	4.8	4.8	4.6
Oct. 20 Div. A 13	81.18	3.88	4.15	5.57	5.57
Oct. 27 Div. B 13	68.7	15.60	6.1	4.6	4.2
Nov. 3 Div. A 13	70.39	7.03	10.35	7.86	4.14
Nov. 12 Div. B 12	73.33	11.66	5.83	5.1	4.06
Nov. 18 Div. A 12	76.6	8.01	9.5	1.4	4.03
Nov. 24 Div. B 12	76.11	7.74	1.30	5.01	3.81
Nov. 29 Div. A 13	59.7	12.29	7.60	11.65	8.73
Dec. 8 Div. B 10	61.16	24.11	5.83	3.80	5.07
Average for 10 weeks	72.03	10.452	6.746	5.579	4.748

CHART 2.

From the above, it will be seen that the "school manufacturing efficiency" is the result of the other terms and is one which we ought to strive to bring to the highest percentage both in the interest of the school and of the boy. Its educational value cannot be over-estimated since it prepares the boy to take his place in industry with an intimate knowledge of the value of time and money. It will be conceded, however, that in order to bring the student to the highest pitch of manufacturing efficiency, he must be given the right amount of instruction, the proper amount of productive and non-productive work, as well as sufficient practice in the setting up of his own work.

I have prepared a table (See Chart 2) showing distribution of shop time covering a period of ten weeks and defining the different terms used therein as follows:

Production Work: Shall include all work upon which there is a price given.

Non-Productive Work: Shall include all work which is not regular production work—such as the making of jigs, fixtures, or any other special work for which no regular price has been set. (Including repairs to machines in the school shop.)

Instructional: Shall include all time which is devoted to shop talks, special instruction, shop visits, inspection of work, etc.

Setting-up: Shall include all time given to setting up and which is generally understood to be taken care of in the piece price.

Lost Time: Shall include all time consumed in waiting for work, tools or instructions,—trucking of work, sweeping, cleaning, oiling or other miscellaneous work.

From an analysis of the above table, the instructor will be able to gather some useful information as to the proportioning of time to be spent upon non-productive, instructional and setting-up necessary to bring a group of students up to their maximum productive value. In this connection, it is well to have the boy keep his own production record. There is nothing to be gained by hiding facts from the boy in the trade school since it is

only on the basis of fair play that we may win his confidence and cooperation.

The conclusions to be drawn from what has been said indicate that since the productive value of the school shop can only be measured by the amount of profit or loss; or, in other words, the productive value of a shop is the amount of work turned out in competition with other concerns manufacturing the same articles and which must eventually show a profit. The only standard of measurement which can be employed in determining the value is a true comparison with competitors.

This would seem to show that the cooperative school is the only form of trade school where values could be established. It is possible, however, to formulate some scheme whereby such a value might also be set on the all-day school. While it might be imaginary as far as actual money is concerned, nevertheless, it will tend to bring the schools more closely to the standards of industry, at least the time element taken to perform work.

TWO RUBBER BANDS AND A TWINE STRING AS FIRST AID FOR ANGULAR PERSPECTIVES.

D. E. Kellogg, Instructor Drafting, East High School, Erie, Pa.

Blackboard drawing in angular perspective is the most convenient way of giving the student a clear mental picture of the object the teacher desires to discuss, when no model is available. Since all teachers do not have the ability to produce this type of drawing quickly and well, either the drawing is omitted or some mechanical contrivance is used as a substitute for that lacking ability. The purpose of this article is to describe the construction and use of just such a simple, inexpensive, mechanical device that will help any one to make angular perspectives so that those lines supposed to converge toward vanishing points will do so.

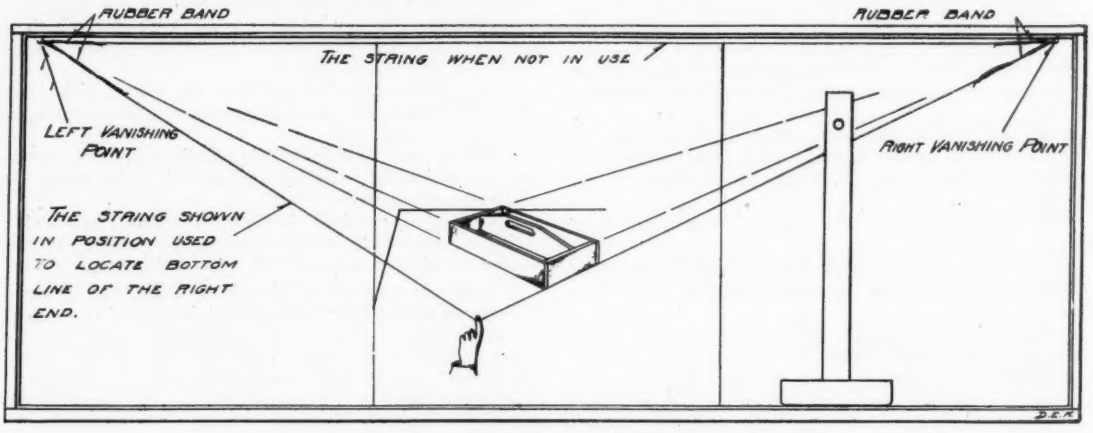
The whole of this device consists of two strong rubber bands looped into the ends of a piece of string ten or eleven feet in length, suspended along the top moulding of the blackboard by means of two small hooks, nails or even thumb tacks. When locating the hooks, place them just far enough apart so that the tension on the rubber bands will hold the string nearly horizontal across the top of the blackboard. The device is ready for use. (See illustration.)

In order to use this device effectively one must first draw the line that represents the nearest vertical edge. Then rub a little chalk on the string, pull it down until it crosses the end of the vertical edge already drawn. Hold the string against the blackboard and snap the string gently as a carpenter does a chalk line. The result will be a thin white line crossing the end of the vertical line and extending directly toward the hook that supports the cord. The hooks will serve as vanishing points for the perspective. Any other edges parallel to the base may be located definitely in the same manner as the one described above. The length of the sides in the drawing must be estimated by the person making the drawing, allowing for the necessary foreshortening. Perspective circles may be easily sketched if a perspective square is first drawn and the elipse drawn tangent to the midpoint in each side of the square. Fillets and rounded corners may be drawn in a like manner tangent to the two lines forming the corner. After the entire drawing has been blocked in in the manner described, dust off all unnecessary lines with an eraser and give the remaining lines the proper rendering freehand.

Try this simple device and note the marked improvement in your blackboard perspectives.

LONG AND SHORT WIN PRIZES FOR BIRD HOUSES.

Two prize winners in the bird house contest held by the American Forestry Association in Washington were the tallest and shortest boys in the public schools, photographed with their prize winning houses. © Underwood & Underwood.


RUBBER BAND
RUBBER BAND
THE STRING WHEN NOT IN USE
LEFT VANISHING POINT
RIGHT VANISHING POINT
THE STRING SHOWN IN POSITION USED TO LOCATE BOTTOM LINE OF THE RIGHT END.
D.E.K.

METHOD OF MAKING BLACKBOARD PERSPECTIVE DRAWINGS.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited nd will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

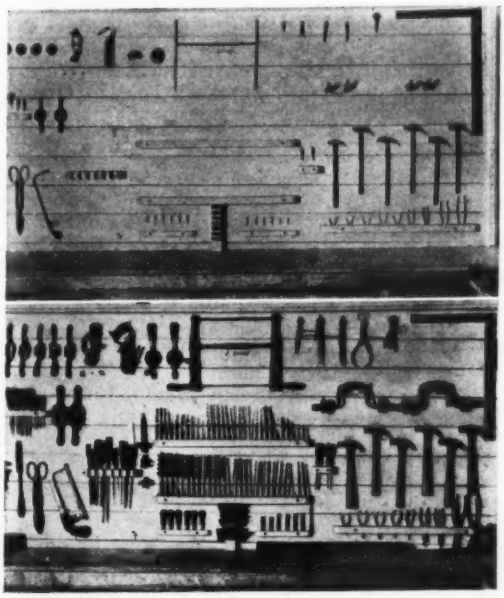
Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

SAVING TIME FOR THE TOOL CHECKER.

Philip I. Shopp, Continuation School, Schenectady, N. Y.

The accompanying photographs illustrate a plan for a cabinet or wall board which saves considerable time in the school shop.

The board or cabinet back is painted white, to afford a decided contrast with the color of the tools. This not only adds to the appearance of the tool room but helps in the distribution of light. When the board is painted to the satisfaction of the instructor, all the special tools used in the shop are carefully mounted on the board. Nails or wooden pegs serve to hold up many of the tools but for the smaller tools, wooden racks with holes or notches are more satisfactory.



TOOL BOARD WITH SILHOUETTES OF TOOLS.

After the tools have been mounted on the board they are traced around with a pencil. Thus, outlines of the tools are left on the board. When this has been done with all the tools, remove them and fill in the outlines, with red paint. When the paint has dried, replace the tools. With a scheme of this kind, the person in charge of the tool room can tell at a glance just what tools are still out and which must be immediately looked up. In actual practice, the plan has worked out well in the school shop.

CONSTRUCTION OF RADIO STORAGE "B" BATTERY.

Geo. H. Wichmann, Coleraine, Minn.

Rapid advances in the method of radio receiving has called into demand a new type of battery known as the "B" battery. The requirements of this battery are that it furnish voltage in units 22½ and 45 volts and also that it may be tapped for a variable voltage ranging from 18 to 22½ volts. The current delivered by such cells is exceedingly small. Dry cells in very compact form have recently been designed that meet the above requirements. However, the life of such cells is limited due to becoming discharged or polarized. The latest tendency has been to develop a high voltage storage battery that is compact, will stand unlimited abuse and is capable of being recharged. Such a battery is especially useful to the radio experimenter.

A storage battery of this type may be readily constructed in the school shop, woodworking or electrical, and closely correlated to work in physics and chemistry. Referring to the sketch and photograph it will be seen that the battery consists primarily of 24 test tubes suitably and securely mounted in a case and arranged so as to be easily connected in series. The case is built from one-half inch pine. Strips about ¾" by ⅛" by 12" are cut from pure lead and shaped as in the drawing, each strip forming the positive and negative plates of consecutive plates and also acting as connectors. To connect the terminals at the end of series rows, also use lead strips. Common lead pipe furnishes suitable material for these plates.

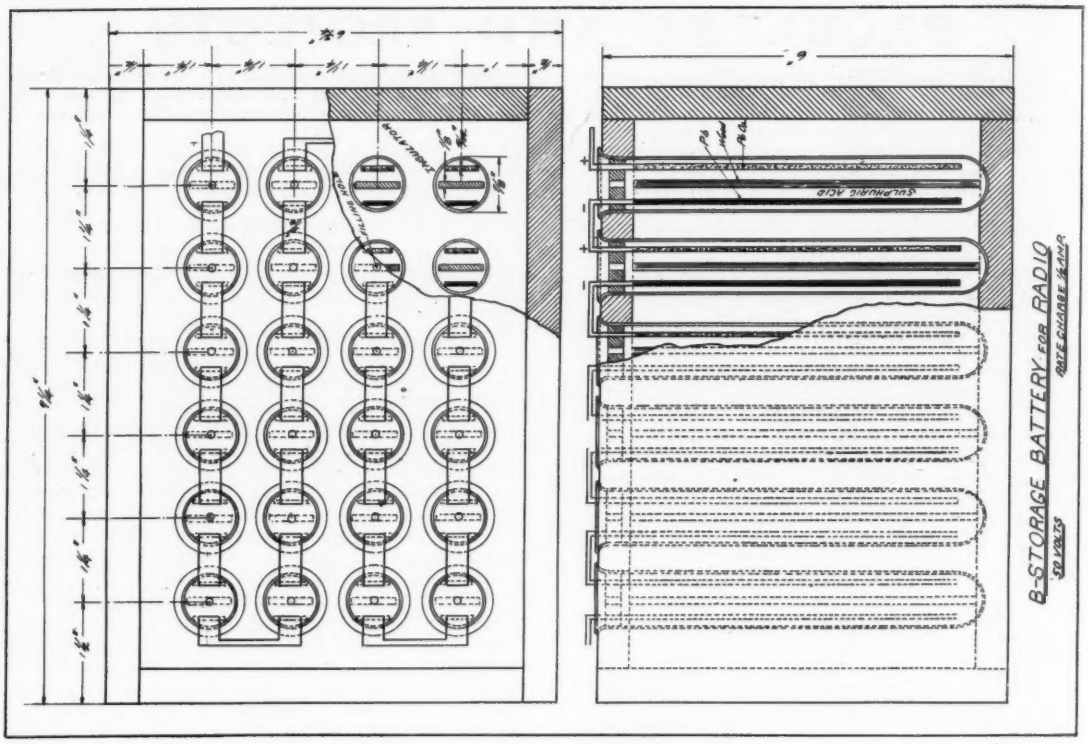
Spaces of wood serve to insulate the plates from each other. Spacers from discarded storage cells serve the purpose better since they have been chemically treated. Turn out plugs to fit the top of test tubes and cut slots for lead plates and also bore ¼" filling hole, the latter serving as an opening for adding distilled water and also as a vent for escaping gas when charging. Before the final assembling of the battery, thoroughly clean the lead plates with steel wool or by scraping. Seal all plugs with battery wax and paint the case with acid-proof paint.

The battery is now ready to receive the electrolyte. Mix a solution of one part of chemically pure sulphuric acid with six parts by weight of distilled water. In mixing the solution use a glass container and add the acid to the water. Stir the solution thoroughly, allow to cool and then fill tubes up to the filling plugs.

In its present condition the battery is totally dead and has no polarity. It differs from the ordinary discharged cell at this point in that its plates are not coated with lead sulphate. Because both plates at this time are alike either terminal may be connected to the positive charging pole.

RADIO BATTERY.

Close the charging switch and regulate the voltage so that a charging current of about one-half of an ampere will flow. This will be found to require about 60 volts. If this power is not available, the battery may be charged in sections and a common rectifier or other battery charging outfit used.



DETAILS OF THE RADIO BATTERY.

Immediately after charging has commenced the plates will assume polarity, the plate connected to the positive charging pole being positive etc. It will be found that alternate plates assume a chocolate color and that all these plates are positive. The other alternate plates become spongy lead and are of negative polarity.

As charging continues the voltage of each cell will build up to 2.1 volts and when the battery voltage reaches 50 volts it is ready for use.

During the process of charging, the electrolytic action of the charging current on the sulphuric acid and water, causes the water to break up, the oxygen being deposited on the positive plate forming lead peroxide while the hydrogen escapes in form of gas. The filling holes should therefore, be left open when charging. Because of the loss of water the specific gravity of the electrolyte increases with charging.

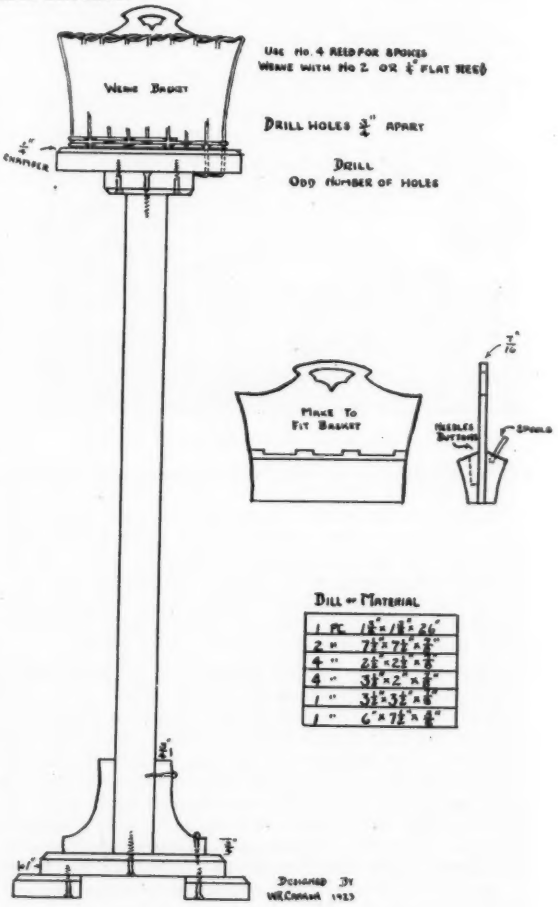
The battery should be charged and discharged a number of times before using. In the discharged condition it is now just like the common storage battery in that there is a deposit of lead sulphate on each plate. Should excessive sediment collect in the bottom of the test tubes the electrolyte should be removed and filtered.

SEWING BASKET.

Walter R. Cannon, Geneva Community High School, Geneva, Ill.

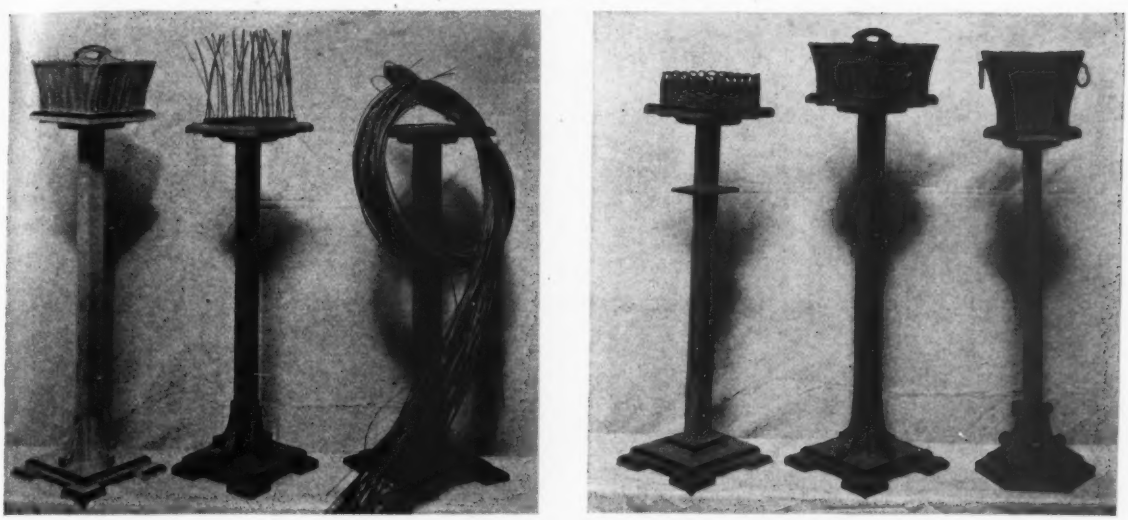
The sewing basket described in this article was designed by the author after a careful search for a project that would meet our purpose. It is true in many classes that there are some pupils who have beautifully furnished homes. Others are unable to stand the expense of projects worked out in hard woods. Consequently we must choose something that will fit in both types of homes. There was another reason for designing this sewing basket, however; that was the combining of woodwork with basket weaving, and the working out of color combinations with enamel.

The stand should be made first, using white pine or hard wood, as desired. When the stand is completed, holes are drilled to fit the reed that is used. Using No. 4 round reed for stakes, and weaving with No. 2 round or ¼ inch



Bill of Material

1	Pc.	1½" × 1½" × 26"
2	"	7½" × 7½" × 2"
4	"	2½" × 2½" × 6"
4	"	3½" × 2" × 6"
1	"	3½" × 3½" × 6"
1	"	6" × 7½" × 6"



SEWING BASKET STANDS MADE IN THE GENEVA, ILL., HIGH SCHOOL.

flat reed, will work out well; or a combination of both might be used.

The reed is soaked in warm water, the stakes are placed in the holes, extending through about 1¾ inches. They are fastened by bending one to the right in front of the next and behind the third. Continue until all the ends are fastened. The weaving is simple when an odd number of stakes is used.

When the weaving is completed there should be five or six inches of the stakes projecting to weave the edge. The edge is woven similar to the way the stakes were fastened to the bottom, except the same is carried out to the fourth, fifth and sixth stakes to the right. The handle is an added effect that will complete the basket.

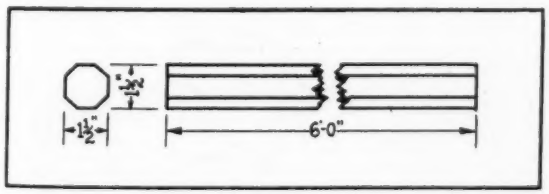
When soft wood is used, the basket and stand should receive a coat of flat white paint, and smoothed with fine sand paper. Then the enamel is applied and the basket is finished by striping with a dark enamel on the chamfered edges. The following color combinations have worked out well: White striped with black, old ivory with brown, light green with dark green and white with dark blue or green.

This same idea has been worked out in fern stands and smoking stands in the author's classes.

BOY SCOUT STAFF.

Fred Short, Barron, Wis.

The staff shown can be made by any boy scout and makes a very valuable addition to his scouting equipment. It can be made from any straight, clean stock such as fir, pine or basswood. The stock should be squared. Then



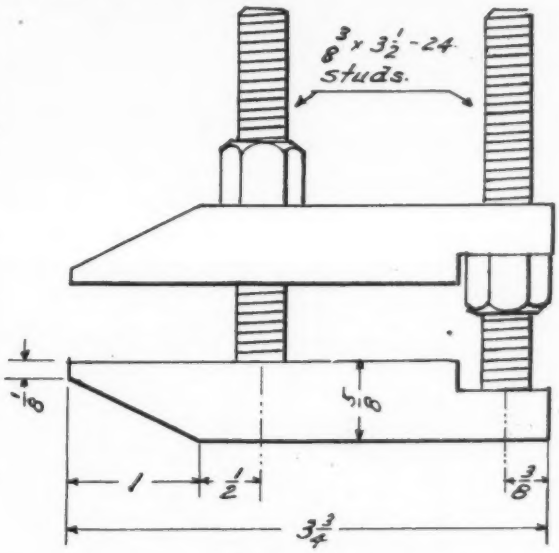
BOY SCOUT STAFF.

the corners should be beveled as shown making an octagonal staff. It should then be sandpapered and may be given two coats of shellac if desired. It may also be marked off in feet on one side by means of notches if desired. These staves are used by scouts in vaulting over fences and small streams, measuring distances, sighting and many other ways.

TOOL MAKERS' CLAMP.

G. C. Polson and W. W. Updegraff, Oakland, Calif.

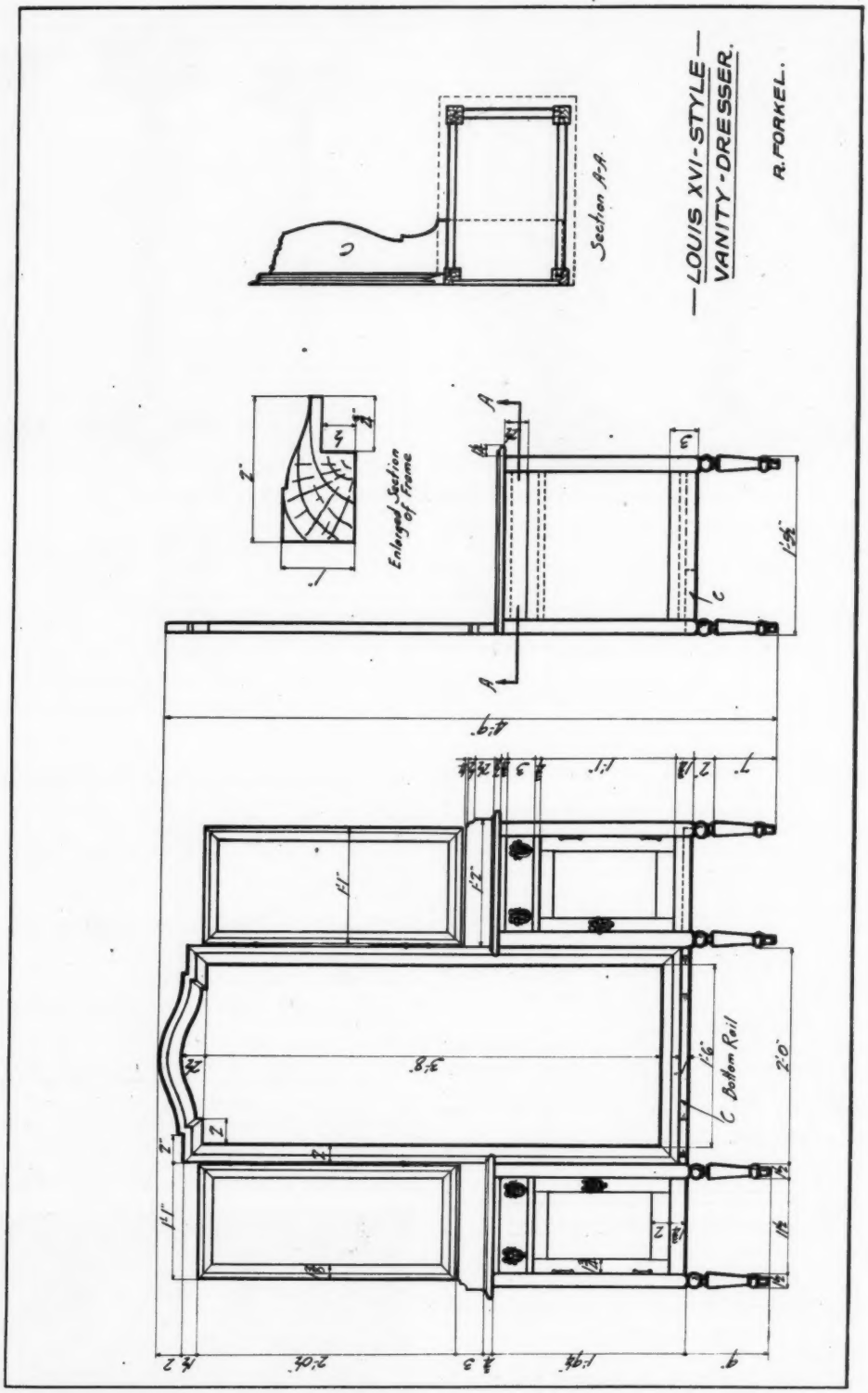
This clamp has some special features which excel the ordinary steel clamp. The stock used is ⅝-inch square



Tool Makers Clamp.

cold rolled steel and the separate jaws are machined to dimensions. The screws are ⅜-inch S. A. E. standard. Both studs are screwed securely into the lower jaw. After this clamp has been hardened and colored in cyanide, it is indeed a very attractive as well as a useful tool.

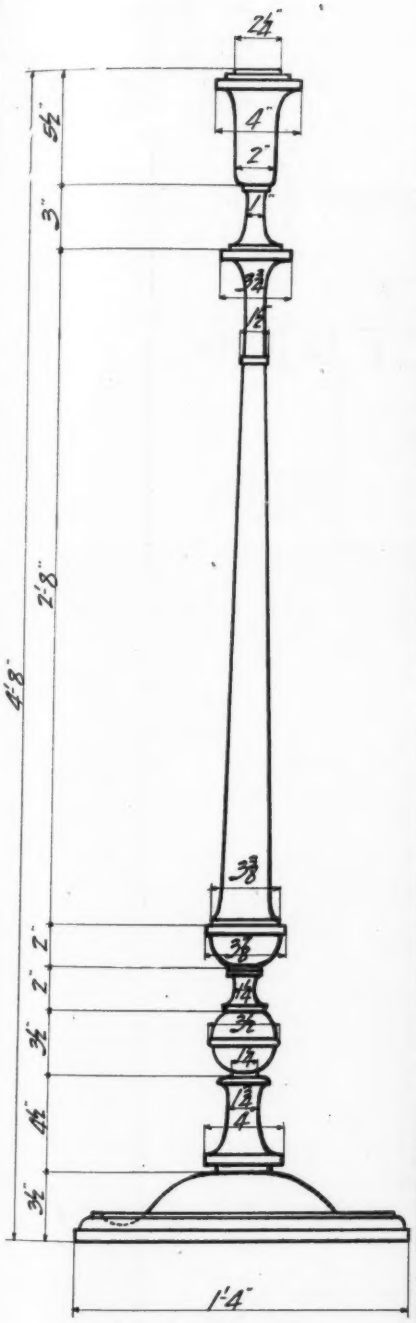
CORNER OF THE LATIMER JUNIOR HIGH SCHOOL SHOP WITH EQUIPMENT FOR WOODWORKING AND PRINTING
(See Pages 171-174).



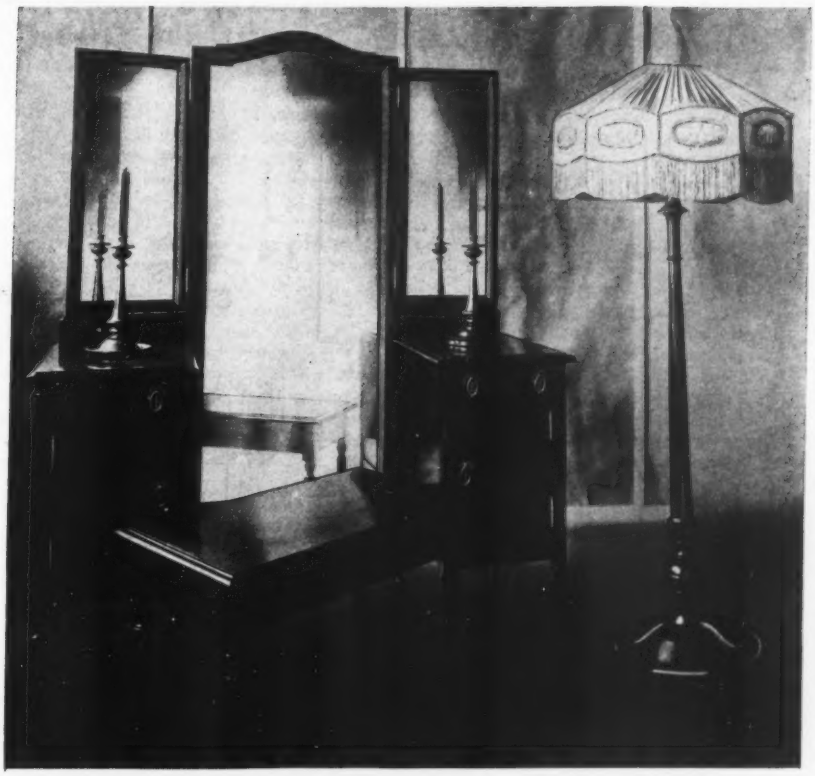
VANITY DRESSER, BED, BENCH AND FLOOR LAMP.

Reinhold Forkel, Instructor School of Industrial Arts, Trenton, N. J.

The Louis XVI style of furniture became popular about the year 1738 with the discovery of Herculaneum and Pompeii. The great art treasures uncovered at that time created new interest in the subject of classic art. During the reign of Louis XV the new art gained rapidly in popularity so that in a short time it held complete mastery over the Louis XV style or rococco. Its influence was apparent not only in architecture but also in industrial arts, and there is available today a large collection of fine furniture and other works of art of the period made famous by these old masters and craftsmen in decor-



DETAILS OF TURNED FLOOR LAMP.



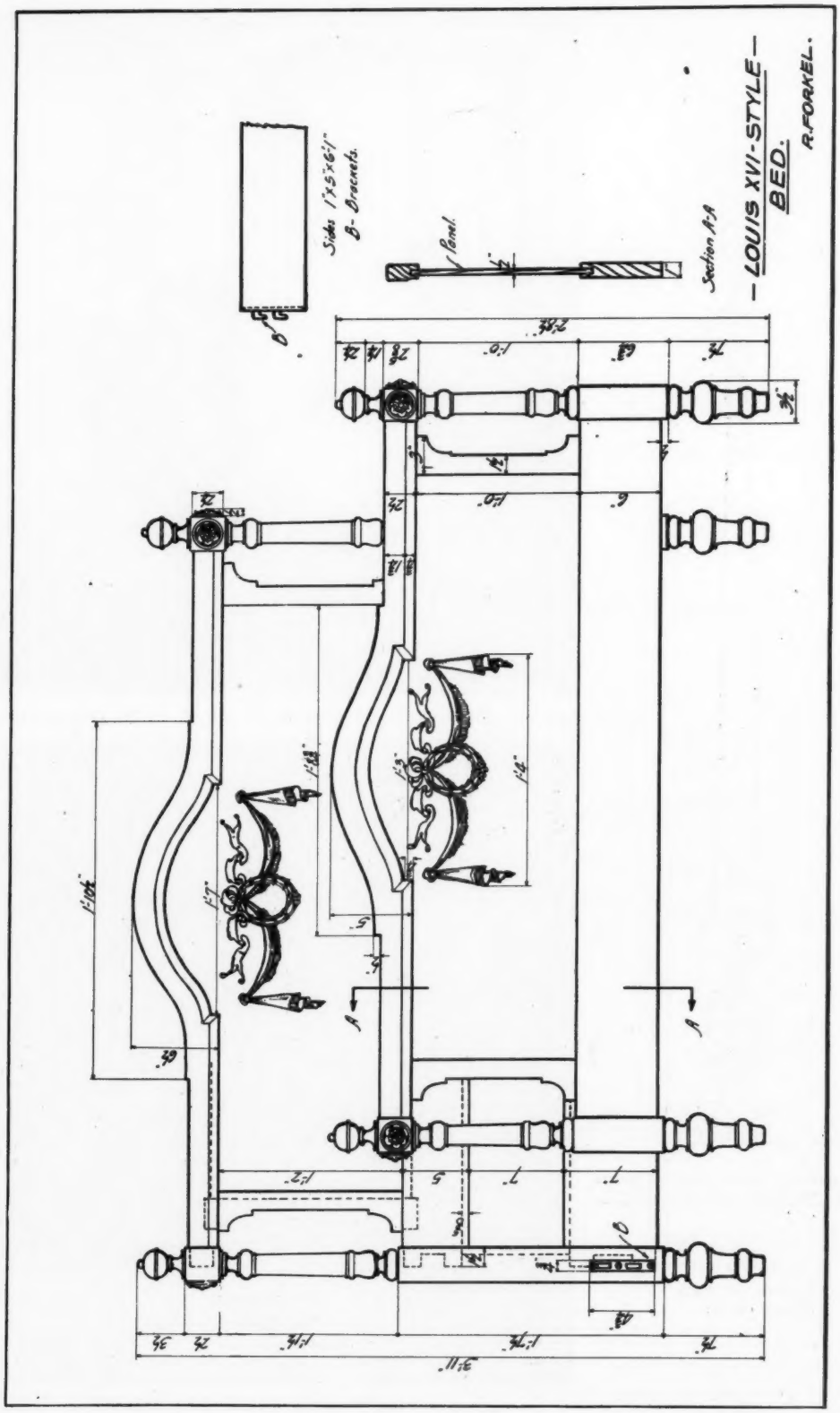
DRESSER, STOOL AND LAMP MADE IN THE SCHOOL OF INDUSTRIAL ARTS, TRENTON, N. J.

BEDSTEAD MADE IN THE SCHOOL OF INDUSTRIAL ARTS, TRENTON, N. J.

ative furniture. The style which reached its greatest height during the reign of Louis XVI, declined in popularity during the period of the French Revolution.

The accompanying photographs and working drawings of a vanity dresser, bed, bench and floor lamp represent the results of a careful study of the Louis XVI style by the students of the wood working department at the School of Industrial Arts, Trenton, N. J.

The pieces were constructed of mahogany, and were finished in a dark mahogany finish, rubbed to a high gloss.



The carving on the bed is one-half inch in thickness and is cut in a light color of mahogany to indicate the contrast.

The Louis XVI style lends itself very well for home finishing and there is no other style which gives such pleasing results in beauty, simplicity and refinement.

Art on the "Iron Range" of Minnesota

Glenn Lukens, Nashwauk-Keewatin, Minn.

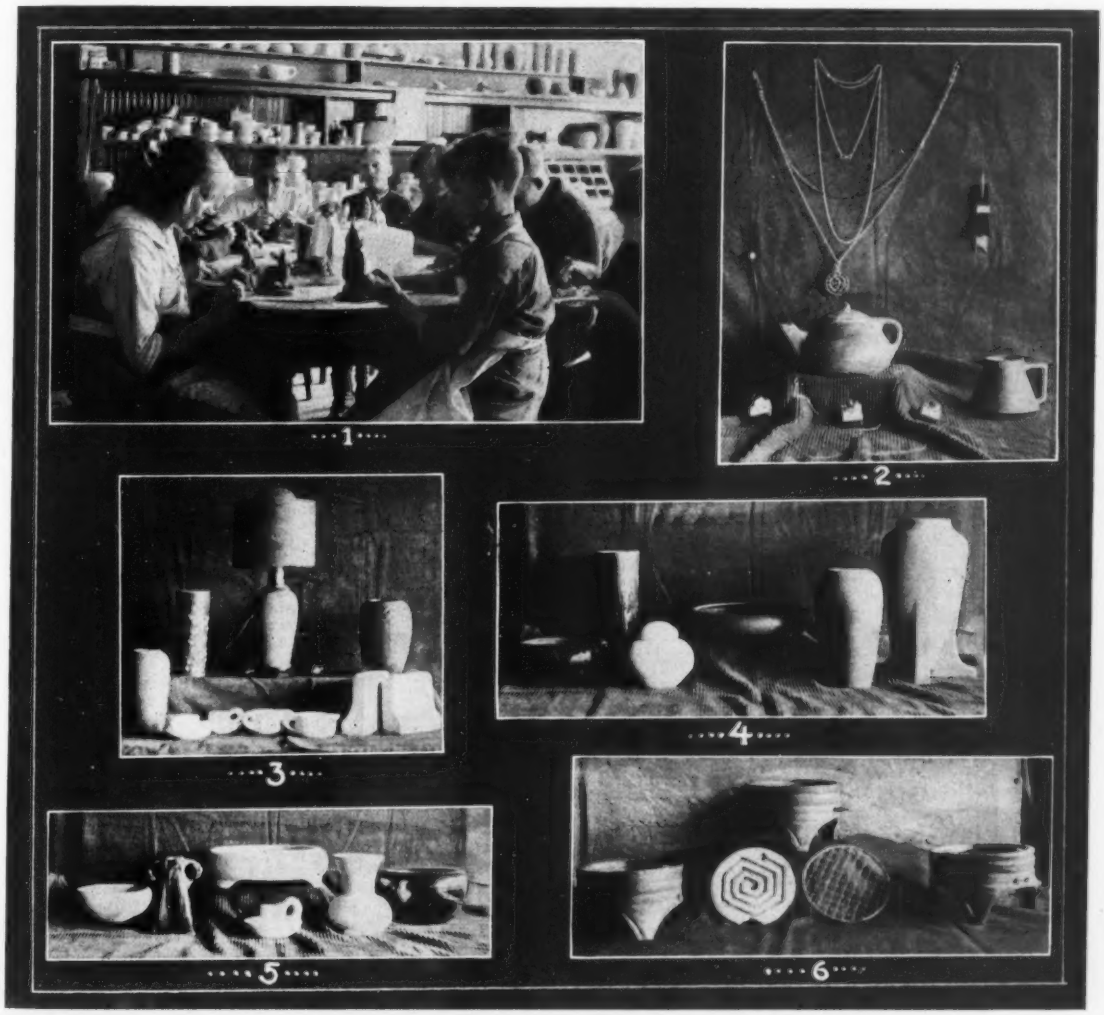
FOR the benefit of those who are not familiar with the term "iron range" let me say that the "range" is a tract of land approximately fifteen miles wide and 180 miles long, in the extreme northern part of Minnesota. It extends over into Wisconsin and even into Michigan. It is a great glacial drift so rich in iron ore that mining companies have but to remove from the surface a few feet of conglomerate and peat, pile this in great dumps at one side of operations and then with steam shovel, crane and flat cars, lift and carry the crude ore away to the smelters across the Great Lakes.

For the most part this area is devoid of everything that makes for beauty elsewhere. One person who came here expressed the common feeling when she remarked that man couldn't destroy the sunsets and that they were the only remaining thing of beauty. In the early days there were beautiful forests, but lumbermen cleared off the trees with the thoroughness of a Kansas tornado and subsequent forest, or brush fires, have finished the work of making the particular section around Nashwauk almost destitute of trees. Only the struggling second growth of poplar and birch remains. Vast beds of peat lie near the surface and during the droughts of late summer these beds become ignited by accident or carelessness and thus start the forest fires that every year create untold destruction in this great north country.

Teachers from far away hear reports of the beautiful schools and splendid equipment here on the "range", and the reports are true. We must have equipment, for success here calls into action every ounce of energy and tests every natural resource of a teacher.

But who do we teach, and what do we teach? We teach foreign children, not necessarily children of foreigners. We are so isolated, and there are so few American families here, that various old world habits persist. Every nationality in the world must be represented here. The mining companies build houses for these foreigners and little groups of these houses are called "locations." These locations are built among the red dumps of refuse from the pits, and swarms of children screaming shrilly at their play surround the locations and greet a traveller on the Range—These locations furnish great numbers of children for the schools of the towns and villages.

The foregoing description is Nashwauk. I mention Nashwauk because one who has travelled the extent of the Range may think of any one of a score of towns that fit the description.



ART WORK PRODUCED ON THE IRON RANGE.
1—A Typical Class. 2, 3, 4, 5—Typical Pottery and Jewelry Work. 6—Toasters Made by Students.

"Teach art to those children," some one says, "How absurd. They need citizenship, hygiene, manners and English far more than they need art." Yes, well let us see.

The art department in our schools has in many ways made up for the pitiful lack of beauty outside. Our courses are exploratory, that is, we offer short courses in the following subjects. Drawing, color, house decoration, clay modlling, pottery, book binding, jewelry making, and colored cement. The art we teach in these subjects is not perhaps the art that is taught in many other schools. Little girls must be taught to keep clean and to make neat homes. A nice bit of jewelry could never be worn on an unkempt or soiled dress. A "from silver" ring with a "real set" in it would look dreadful on soiled fingers. A beautiful bit of pottery made in class and glazed with a "shine" has often become the center around which a little bower of cleanliness and beauty and order has been formed even though the house itself is but a "tar shack."

Many little Salvatores, Angelos and Rebeccas have found a haven in the sunny workrooms of the art department and not alone have the pupils found happiness there but the parents as well. Often, when the school is open for night classes in pottery, foreign mothers will peep timidly into the workrooms and finally venture in. One old mother from northern Italy said, "Never in all my life have I seen such a prettiness."

A little Italian boy came one Monday morning and announced that he had modelled a little angel head of clay from the dumps. I asked if I might see it. He rushed home and brought the little clay image. His eyes fairly shone with pride, but his hands—he wore no mittens and his hands were dirty and chafed with the snow and cold. I asked him if he thought it was just right to model beautiful little angel heads with such very dirty hands. Well perhaps it wasn't just right. Next morning I saw him in the post office. "See," he said, "They're clean." And truly they were clean but at considerable cost of flesh and blood. He had scrubbed them till they were nearly raw. We gave him a little healing ointment, he caught the thought and now his hands are always clean.

The best loved subjects are pottery, color, and jewelry. This article is not intended to serve as a treatise on method but rather, in some small manner, to act as a stimulus to other teachers who may feel that their pupils may never produce "the one fine thing of beauty 'ere they die.'" Many excellent articles on clay modeling and pottery have been offered in this Magazine.

Much of our work in drawing is done with clay as a medium. It trains pupils to think in three dimensions. Seventh and eighth grade children love to model small animals like chickens, frogs, rabbits, cats. and even larger objects such as the "Bear Eating," by Bayre and the reclining "Lion" by the same artist. These when modelled are given a biscut firing and are then given a coat of white shellac. When the shellac begins to dry or get tacky we dust the piece with one of the many metallic powders on the market. Statuary brown or antique copper are the best. The latter gives the effect of a fine piece of bronze, and the result is always so lovely that it draws from the pupil his very best effort. As nearly as possible we follow actual methods in use in the larger workshops and studios. In this way we typify in a small way a world industry. In making our electric toasters we use a plaster mold and press the soft clay into the mold. After glazing, the pupils do their own wiring with resistance wire.

A resistance wire for use in electric toasters as a heating element can be purchased from the Driver Harris Co., Chicago, Ill. It is the No. 193 Resistance Wire Gage No. 23. A piece twelve to fourteen inches in length, properly coiled will carry a current from the ordinary electric light socket and will become red hot without oxidizing. If the wire is more than fourteen inches long it will not become hot enough and if less than twelve inches it will soon burn out.

We use the potter's wheel for turning such forms as vases, bowls and lamps. For certain other forms we do casting by pouring slip into plaster molds. The work in all beginning classes is done by rolling the clay into coils. Our library table lamps are done in this way.

The winters in the northland are long and the daylight hours are short. We offer a pottery course in the evening-school classes and when time for enrollment arrives our classes are soon filled. People with similar interests are thus drawn together and the sociability enjoyed while producing vases, table lamps, and other beautiful things for the home is one of the very great benefits derived from such an art course.

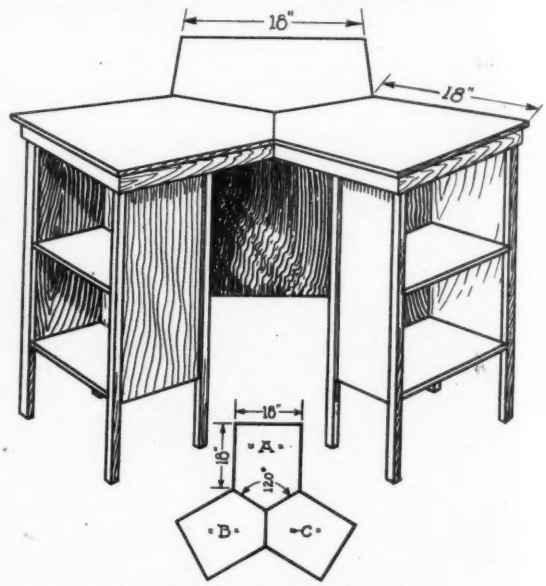
I wish to repeat that the intention in this brief article has been to indicate in a fragmentary manner, what art can do, and what it is doing in a land to which facetious friends say requires a passport to enter.

In this column we propose to print from month to month novel problems in shop work picked up from the month novel problems in shop work picked up from the correspondence of readers and from other sources. A prize of five dollars will be paid for the most acceptable answer which is received and printed. Any reader is eligible to send in a reply. Address, Editor, Industrial-Arts Magazine, Milwaukee, Wis.

A LIBRARY CHARGING TABLE.

A subscriber to the MAGAZINE writes the following letter and the accompanying drawing:

"I would like to have some information in regard to the construction of a piece of furniture. The design of the piece is as cut. It is a library table which has three sections with book shelves under each section.



SKETCH OF THE PROPOSED TABLE.

"I want the construction to be so that it will support itself without any center leg, if such is possible. The shelves should be designed so as to support heavy and many books."

The Editors of the MAGAZINE will pay five dollars in cash for an acceptable answer to this problem. Letters and sketches must reach us not later than May 1st.—Managing Editor, 129 Michigan St., Milwaukee, Wis.

"ACCEPTED."

To the Editor:

In the editorial section of the March issue 1923, in your magazine, the title "Pattern-making as an Industrial Arts" caught my eye and after reading it over several times it impressed me as being the truth, not folly.

Being a pattern-maker by trade I accept the article as logical, and heartly agree with its author.

The teaching of pattern-making can be started as early as the seventh grade, thus giving the boy who is adapted with the skill required a chance to study the art for four years, as many of these type of boys only attend high school two years.

Any kind of hand training properly taught acts as a tonic. It helps to build character, develops accuracy and neatness and creates a desire for better society. Go and visit a pattern-making shop and you will find there a class of men that are deep thinkers, with a wonderful reasoning and visual power, skilled in hand work, machine operations, neatness, accuracy, design, drafting and molding. They are found to be lovers of good literature and problem-solving and inventive.

The pattern-maker represents the following group of artisans: 1, designer; 2, draftsman; 3, pattern-maker; 4, molder; 5, machinist.

A pattern-maker's training should begin with the observation method, and systematically develops the power to visualize.

If you ever have the opportunity to visit a factory where large machines are used, be sure and examine one of them and try to picture in your mind what a working drawing would look like of the machine, and then try to work over in your mind just how the pattern-maker would go about the making of the patterns for the machine, then think of the molder and picture yourself trying to ram up a mold in sand that will hold hot metal to give the iron form, the shape of the patterns, then think of the machinist and try to place yourself in his shoes and see how far you could go in the direction of machining the castings and produce a completed machine to work like the one you are looking at.

Now think of the designer while you are still looking at the machine, and try to convince yourself that pattern-making is an ART, and only men with adapted ability ever make pattern-makers, but such a training in the school does make better workmen regardless of trade or profession.

Yours truly,
J. A. Williams.

NOT A FINISH TROUBLE.

To the Editor.

In the April number of the **Industrial-Arts Magazine** I have noticed the paragraph and photograph cut offered by Mr. Merriman, Fort Collins, Colo., which he heads as "A Finish Trouble." It is not a finish trouble but a cabinet making mistake. As he has outlined the conditions, I diagnose his trouble as follows: First, he soaked the boards in hot water. By so doing, he greatly tends to decrease the strength of the glue joint through dilution of the glue upon application to the joint. It is far more preferable to warm the boards to about body heat or 100°F. rather than use hot water to heat the joint. It is a well-known fact that glue joints, whether rubbed, splined or dowelled, have a marked tendency to shrink within the glue areas. It is for this reason that top stocks are made up in the factories from 30 to 90 days ahead of use before being permanently machined and sanded. In this way the glue joint is allowed to shrink to normal conditions and the inequalities are removed in the final sanding. It is perfectly proper, and in fact desirable, that excess glue be removed, with hot water, from top and bottom boards in top construction. This effectually removes waste material which would otherwise spoil tool edges as well as proving to be a source of unnecessary labor. Likewise. I find that it equalizes the strains and cross stresses in the assembled tops. These observations are based on considerable experience with student labor as well as a constant study of factory conditions and methods. To sum up my recommendations would be to make up the top in the rough, allowing sufficient over size in thickness, width and length. It should be clamped up in some kind of cawls in order that it may dry without warping. The rest of the frame should then be laid out and assembled in order that the top may season as long as possible. The top should then be fitted, scraped and sanded, sponged, dried in a warm room over night and resanded. It is then ready for the paint shop where a suitable finish can be applied.—Ralph G. Waring.

NEW BOOKS.

Continu-Operative Lessons in Printing.

By Winfred A. Woodis, Worcester, Mass. Continuation School. Published by the author.

In "Continu-operative Lessons" in printing for continuation or part time printing schools, there has been a very successful attempt to correlate trade and related material in the form of informational outlines, They are intended to aid the instructor in analyzing the lesson which is about to be taught, and also to serve as a guidance of the pupils' mental and manual activities.

The lessons are arranged in groups of six sheets each, which consist of (1) teacher's analysis, (2) shop practice, (3) trade mathematics, (4) trade science, (5) trade history, and (6) trade English. These sheets are prepared in loose-leaf, bound form, and also on individual cards for distribution to students.

In the "teacher's analysis" the author has endeavored to apply the five points commonly listed under "method" of a teacher's lesson plan, which are: 1, aim to teach; 2, preparation; 3, presentation; 4, application; and 5, test. The material under "Preparation" and "Presentation" seems to indicate a varied use of these steps, and they would be more helpful if more uniformity could be secured in their interpretation. The term "test" is also misinterpreted for "application" as used on the analysis sheets since they do not indicate what may be desired in the way of results, and the method of checking the results is not given.

The lessons included for academic related work are well selected and valuable for their broadening and cultural qualities rather than shop practice. Of course the practice of separating the related academic material from the shop course does not conform to modern vocational ideals because the best time to teach this work is at the time when it can be applied to shop problems, in the shop, and by the shop instructor. However, many schools still teach these subjects separately and these sheets will prove very valuable as a basis for teaching related subjects.

Much credit must be given to Mr. Woodis for the systematic and analytic arrangement of his lessons, the selection of material, and for the high standards of typography used throughout.

Job Analysis and the Curriculum.

By Edward K. Strong and Richard S. Uhrbrock. Published by Williams & Wilkins Co., Baltimore, Md.

This text is a clear, well-presented statement of the significance, meaning and application of job analysis to planning work for teaching. Job analysis as a means of securing accurate, pertinent, well-focused content for instruction is clearly explained. Sample statements of job analysis procedure are given indicating in easily understood detail, the procedure to be followed by any individual or agency conducting the job analysis.

Sample specific listings are made of the content of the jobs of printing executives. A considerable portion of the book is given over to an analysis of a printing curriculum as worked out and developed from the job specification for printing executives. Those interested in any instruction in printing, either to journeymen or executives, will find instructive material in this book. All who are interested in the present trend to make instruction lead to some objective will find the time well spent in covering the material of this book. It is a valuable contribution in the field of curriculum-making with the content based upon facts rather than theories.

The School Book of Forestry.

By Charles Lathrop Pack. Cloth, 159 pages, illustrated. Price, $1. The American Tree Association, Washington, D. C.

The romance, the charm and the vast economic importance of forests are presented in this book in simple form for young readers. The book will find a welcome place in school libraries for supplementary reading in connection with the study of wood and wood products. The manual training teachers will find it a source of helpful information for reading by their classes, especially in the seventh and eighth grades, where wood working is the chief manual arts subject.

Mechanical Drawing Problems.

By Edward Berg and Emil F. Kronquist. Cloth, 223 pages, illustrated. The Manual Arts Press, Peoria, Ill.

This new edition of Messrs. Berg and Kronquist's widely used mechanical drawing text contains practically all of the original problems and plates. The changes are chiefly in the addition of teaching and study aids in explanation and illustration of points which have been found puzzling to students and users of the book. Clever use has been made of certain unused space in the original edition for many useful hints, short cuts and mathematical data.

BOSTON VOCATIONAL SOCIETY MEETS.

Mr. George Greener, Principal, and the instructors of the North Bennett Industrial School, Boston, acted as hosts on March 10th to seventy members of the Vocational Education Society of Boston. The March meeting of the society was considered "one of the best yet." An excellent luncheon was served and every possible care was taken for the physical comfort of the guests by Mr. Greener and his assistants.

After a business session, Mr. James Forbes, Director of the Vocational School at Southbridge, Mass., spoke on the subject "Standards of Measurement for Determining the Productive Value of a School Shop." Mr. Forbes, in his talk was decisive and direct. He carried his points clearly and forcibly and in every way met the fine standards which had been set by speakers at other meetings this year. Mr. Forbes's address will be printed in full in another part of the Magazine.—J. I. Lusk.

MARCH MEETING OF THE SCHOOL CRAFTS CLUB.

Gathering in the Ethical Culture School on Saturday evening, March 17, the members of the School Crafts Club heard and took part in discussions of a round table nature which proved very interesting as well as enlightening. After the meeting was called to order the men separated into groups, as their interest dictated, gathering together again later for the summary of round tables and a brief business meeting.

Mr. Robert B. Shirley, of the mechanical drawing department, Fawcett School of Industrial Arts, Newark, N. J., took charge of the table at which mechanical drawing was under consideration. First of all, in teaching drawing there must be taken into account this question: What are the students being trained for? It makes some difference whether the aims are for general education or vocational education. Mr. Shirley outlined a very thorough course, to extend over three years, for pupils studying machine design. Blueprints are used for illustrative and explanatory purposes, but the drawing is not copied, since the problem is left for the pupil to solve. Mr. Shirley uses the Egyptian style of lettering because of its simplicity. Drawings executed by the students of the Fawcett School of Industrial Arts attracted much attention because of the splendid technique and rendering displayed.

Mr. Frederick C. Arnold, Evander Childs School, New York City, spoke as to the ground that should be covered under different time conditions. Any teacher makes a mistake to slight isometric drawing in conjunction with mechanical drawing. The method of procedure in making a plate of a punch and die was discussed. It should be done in a manner as near that of shop and drafting room practice as possible. Practical experience on the part of the instructor proves a great aid in accomplishing this. Mr. Victor H. Strombach of the architectural drawing department, Fawcett School of Industrial Arts, gives lettering plates at the beginning of his course. He works into housing problems as soon as possible, the work being assigned from the blackboard or from models. A solid foundation of architectural drawing details is laid before any planning of a building is considered. Mr. Strombach exhibited some very fine perspective drawings of garages, dwellings and public buildings, which had been drawn by his students in a night school course.

Shop teachers are always looking for helpful suggestions as to wood finishing. Such a discussion was led by Mr. Frank L. Cain, Oliver Street School, Newark, N. J. He spoke on the breaking in and care of brushes, kinds of stains, preparation of stains, and color ingredients. He recommended Du Pont penetrating stains for those who prefer to buy ready mixed stains. Filler gives best results when thinned with gasoline, rather than with turpentine. Putty should be colored to match the finish and applied after the stain and one coat of shellac have been applied. Waxing is an efficient method of getting a rubbed finish under shop conditions, on top of several coats of varnish. However, rubbing with pumice stone and then rotten stone with oil for the final coat gives better results.

Mr. Rudolph Shrivanek, instructor of auto-mechanics in the Public Schools of Elizabeth, N. J., spoke on "The Place of Automotive Instruction in the Public Schools." Woodwork alone should not be stressed in shop courses because other materials are of equal importance in our civilization. The education involved will depend upon the type of school, but in this instance the aim of the course is not to train auto-mechanics, but to develop more intelligent consumers. A central shop for this instruction is the economical solution. The cost of this instruction would not be any more than the now existing courses in woodworking. Automotive service work should be divided into three groups: (1) adjustments, (2) repairs, (3) replacements. The greatest problem at present is to find men equipped to teach this work, and the normal schools must add teacher training in this work to their present courses.

At the Forum the subject under discussion was "How to Get as Near One Hundred per cent Reaction as Possible From the Men Under Your Direction." Mr. Allen D. Backus, supervisor of manual training in Newark, led the discussion. First of all, the supervisor must be able to get cooperation from his teachers. He must have a clear idea of the teacher's aims and must consider manual training an important regular school subject, rather than a special subject. There has been too much made of this special subject idea. Moreover, he must not let his teachers think that teaching is not well paid, but must hold forth the satisfaction that is received in dealing with boys. He must have a well developed sense of fair play and should praise or censure only when it is deserved. He must be sincere with his teachers.

Here are some questions which are constantly before the supervisor: (1) How should the teacher who resents criticism be dealt with, especially a kind who tries to argue no matter how wrong he may be? (2) How should you get over a policy to the whole system, through individual methods or teachers' meetings? (3) How long should a supervisor visit in a shop? What is going to be the impression on the teacher of a short visit? Will he think the supervisor does not take in details?

Mr. Ernest W. Tuttle, director of industrial arts, East Orange, N. J., continued the discussion. Criticisms of teachers should be of an individual nature and a teacher should not be censured before a group. The duties of a supervisor are the getting of supplies, obtaining teachers, keeping the department up-to-date and in smooth running condition, and to represent the department with higher school authorities. The supervisor is in a different atmosphere than the teacher and has greater advantages for reading and visitation to keep in touch with progressive principles and methods. A teacher may stand still, go backward, or go forward. He should benefit from the criticisms of the supervisor who has had greater experience and has a chance to see more teaching situations. The teacher who argues and refuses to be convinced in regard to incorrect methods he practices, is harming only one teacher, himself. He is going backward.

Mr. Joseph H. Constantine, director of industrial education and continuation schools, Passaic, N. J., stressed the need for cooperation between the teacher, principal and supervisor. Responsibility must be placed upon the teacher to strengthen his initiative. A teacher should not be merely the mouthpiece of his supervisor, but should have a hand in laying out the course of study. A teacher must be kept keyed up on his ambition, and projects should be changed often to prevent him from getting into a rut. One way to handle the teacher who resents criticism is for the supervisor to bring the subject up again at a later visit and, if the teacher is still contrary, to then say that such and so must be done. Another method of approach would be: "My experience has been, etc. * * * Try this."

A supervisor must not pose simply as an inspector but must make his criticism instructive. Often it is helpful to the younger teachers for the supervisors to hold up before them the work done by successful teachers in the system. It is well when showing a visitor a shop to let the teacher tell what ground is being covered. Team work is necessary and the supervisor cannot do it all. Sociability is a great aid in handling teachers, yet one must be careful not to overstep the line. Oftentimes at informal school affairs helpful discussions crop up.

Mr. Backus went on to say that a supervisor must be optimistic, for small results are at times worth great effort. The supervisor should have ability to teach the subjects he supervises in order to illustrate some principle he wishes to advance.

A committee was appointed in the business meeting to draw up a resolution, an expression of regret and sympathy, to be sent to the widow of the late Dr. James Parton Haney, who was the founder and first president of the School Crafts Club. Dr. Haney died on Saturday, March 3.

The Annual Banquet of the Club is to be held on Saturday, April 28.—Lloyd F. Stair.

ESSEX COUNTY ARTS MEETING.

The Essex County Arts Association held its second annual sectional meeting in March, at the Montclair High School, Montclair, N. J.

The association is divided into sections, or groups, namely, fine and applied arts, industrial arts and vocational training, and household arts. These groups meet four times each year, in various parts of Essex County; sometimes they meet in one general meeting, with one speaker and sometimes divided into round-table sections. There are about 425 members in the association.

The fine and applied arts group at this meeting was particularly interesting. Under the chairmanship of Miss Della M. Hackett, of the East Orange High School, a splendid program was worked out with fine speakers for each department.

Miss Florence Bassett of Newark, N. J., gave a fine talk on what can be accomplished in the defective classes. She gave a fine exhibition of her work on display tables. Miss Gunther also had an exhibit of the industrial art work in grades five and six of the Montclair schools.

Mr. Judd's talk on Wireless was very interesting and a large group was present to hear him.

The printing in the Montclair High School and the junior high schools were well taken care of by Mr. Baker and Eugene L. Sullivan. The program was printed in Mr. Sullivan's shop and the front-cover design was cut from linoleum block.

Miss M. Youmans, chairman of the household arts section, had a fine program. Miss Green of the Hillside Junior High School, Montclair, and Miss Lundell of East Orange, gave an interesting discussion of the phases of home economics which have been stressed this year in the several communities of New Jersey.—J. W. Cavileer.

NEW HEAD OF STOUT INSTITUTE.

Mr. Burton E. Nelson of Racine, Wis., has been appointed president of Stout Institute, Menomonie, Wis., to succeed the late L. D. Harvey.

Mr. Nelson is a native of Pennsylvania and received his early education in the schools of the Keystone State. He is a graduate of Whitehall Military Academy, Millersville State Normal School, and Western Normal College. He received degrees from the latter institution in 1890 and 1894.

Mr. Nelson served as superintendent of the Racine schools for fourteen years, and of the Lincoln, Ill., schools for four years. He resigned from the Racine superintendency in 1918 to become Wisconsin director of the sales department of the Keystone View Company.

STUDYING VOCATIONS.

John M. Pierce, Springfield, Vermont.

It is well recognized that vocational education to be valuable must be accompanied by some form of vocational guidance. Unfortunately, the guidance phase of vocational training is frequently neglected in the effort to introduce vocational courses in the curriculum. As a step toward vocational guidance, the following plan developed in Springfield, Vermont, is offered because of the beneficial and interesting results which have been obtained.

Members of the Cooperative Class were given sheets like the following and were asked to have them filled out and to submit them to their instructors.

MR. ARTHUR WILLISTON,
Recently Director of Wentworth Institute,
Boston, Mass.

BURTON E. NELSON,
President-Elect, The Stout Institute,
Menomonie, Wis.

Vocation Studied: Tool maker. By John Fairbanks.
Firm: James & Lawrence Machine Co.
Check nature of vocation: Production, **Manufacture**, Commerce, Service, Education, Organization.
Knowledge necessary or desirable: Ability to read drawings, measure accurately, work to close measurements. Must have knowledge and ability to use the machine tools.
Work constituting said vocation: Making special reamers, cutters, and other tools. Making jigs for the drills and the mills.
Education needed: Special. Physique desirable: Good.
Personality needed: Patient, careful, dependable.
Time required to prepare for vocation: Four years.
Cost to prepare: $.....
Means of preparing for it: Vocational school, serve time as an apprentice, or work in a shop.
Hours of employment: (a) in plant, 9; (b) Outside, 0.
Vacations: Two weeks with pay, **without** (check).
Opportunities for self-improvement: Correspondence school courses, night school, reading and study at home.
Leads to what: May become a foreman or executive.
Yearly pay, average: $1,600.
Reasonable maximum: $2,000.
Authorities consulted:
Persons, give position.
John Fitch, toolmaker.
Mr. Bush, superintendent.
Mr. F. H. Crow, employment manager.
Books, give author.
"Occupations," Gowin & Wheatley.
"Tool Making," American Machinist.

The reports when received by the class were examined by the teacher and when approved were used as a basis for a thousand word theme which formed part of the English course. The report sheets themselves were filed in the departmental office as a source of information for boys in choosing their careers. The boys were asked in each case to consult at least three people who were engaged in the work, which they intended to follow. They were also asked to read certain reference books.

HEAD OF WENTWORTH INSTITUTE RESIGNS.

Arthur L. Williston, principal of Wentworth Institute, Boston, Mass., for the past twelve years, has resigned.

Mr. Williston is a graduate of the Massachusetts Institute of Technology. In 1891 he became a teacher and educational administrator, first at the Massachusetts Institute, and then as director of the department of industrial arts and engineering of Ohio State University. Later he became director of the school of science and technology at Pratt Institute, Brooklyn, N. Y. In 1910 he was called to Wentworth Institute as principal of the school which had been newly created and endowed.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Finish of Chestnut.

337. Q:—I have a magazine rack and dressing table made from chestnut. I wish to give them a good glossy finish. Will you kindly inform me in detail just what to use and how to apply it to get this finish? The chestnut is very light and porous. Therefore, I am afraid it will take a dark finish and I want it to look more like an oak finish. I will appreciate it very much if you will inform me as to the best method of doing this.—C. C. L.

A:—Be sure that the chestnut has been carefully sandpapered with the grain with at least OΘ paper, making certain that all edges have been rounded at least ⅛" in order to prevent wearing through the finish, in subsequent years. Make up a silex filler by using twelve parts of boiled linseed oil, six parts of dark japan drier and one part turpentine to which is added enough finely ground silex to make a stiff dough. Let stand over night after which remove enough, so that when added to the thinning liquid, it will make a quart of silex ready to apply, having the consistency of milk. This thinning liquid should be two parts benzine and one part turpentine. The filler up to this point is "natural" or colorless. For a satisfactory finish, it seems desirable to add some color and you will probably find the use of one-half cupful of turpentine asphaltum stirred into the thinning liquid of the quart of mixed silex will give you a pleasing shade. Should, however, other shades be desired, they can be secured by adding to the asphaltum mixture, various amounts of raw sienna, Van Dyke brown, drop black, raw or burnt umber, all ground in oil. By carefully measuring these amounts with the use of a tablespoon carefully levelled off, and recorded as used; a shade can be arrived at which is satisfactory and capable of being reproduced from time to time. The shade should not, however, be judged or accepted definitely until it has been brushed on the chestnut with the grain; allowed to set sufficiently for the filler to lose its turpentine gloss; rubbed in across the grain with burlap, and cleaned up with a rag. It should dry at least forty-eight hours in a warm room and if not entirely levelled off in the pores, should be refilled, as is often necessary in so coarse a grained wood as chestnut. The dried filler coat should now be treated with a sizing coat of dilute white shellac in order to judge the color. If satisfactory, on the sample panel, the magazine rack and table may now be filled, taking especial pains to clean out all edges and panel lines with a picking stick. Let dry forty-eight hours in a warm room, dust off and varnish a well worked out coat of high grade floor varnish; omitting the shellac coat which is not necessary on filled work of this type. The first coat of varnish should be allowed three to five days for drying in a warm room and then carefully sandpapered with a split 6-O paper, dusted off and revarnished with a full bodied coat. This also should be sanded when dry and revarnished for a third time. This should dry seven days after which it may be rubbed out with felt pad, pumice stone and water and cleaned up with a good polish. This will probably give a sufficient gloss to produce a satisfactory finish.—Ralph G. Waring.

339. Q: In finishing gum a dark mahogany I did this: Used a spirit stain, filled with filler stained same color, and when dry rubbed to a clean polish. I then gave two coats of floor varnish of good grade like Berrys. The result always looks wavy or sitted—not like a good commercial finish. Why is this?—R. E. S.

A. Your combination of finishing materials is bad as witness the results which you have obtained. In the first place gum does not respond to a spirit stain and should not be filled since it is a non-porous wood in the general sense of the term. Your stain as used is partly soluble in the varnish and therefore would be quite apt to cause it to sink into the wood or cause pitting of the varnish by the stain bleeding through. As a correction I offer the following:

Sponge the wood carefully with hot water and a fiber brush so as to raise the grain and any bruises as well. The use of a small amount of hot water accomplishes quick results through rapid evaporation with the avoidance of any undue shrinking or swelling of the moistened wood. When dry, sand clean with worn out 00 paper, dust off and apply a coat of hot mahogany water soluble stain. Unlike the spirit stain this will enable you to produce the same shade on end grain as on the face grain. Let dry overnight without sanding and apply a very thin sizing coat of shellac slightly tinted with alcohol soluble Bismarck brown and if necessary shaded to brown with a slight amount of alcohol soluble black. Let dry until completely hardened, then sand clean and smooth with split 4-0 paper. Dust off, take into varnish room and give a good coat of high grade varnish. Dry three days or more at 80° F. Then sand smooth and free from nibs with a split 6-0 paper. Dust off and revarnish. Dry and sand as before. Revarnish and after drying one week rub to a true surface with 00 pumice stone felt pad and water. —Ralph G. Waring.

Woodwork and Related Subjects.

357. Q.: (1) Will you kindly tell me where I can get some information related to woodworking? In our shop we use cypress, oak, pine, red cedar and mahogany. (2) Could you inform me of the correct name for the wood called North Carolina Pine by the trade?—T. D. C.

A.: Kellogg's "Lumber and Its Uses," $1, Radford Architectural Co., Chicago; Noyes' "Wood and Forest," $3, Manual Arts Press, Peoria, Ill.; Bassett's "Story of Lumber," $0.75, Penn Publishing Co., Philadelphia, Pa.

Kelly's "Expert Wood Finisher," $3, A. A. Kelly, Malvern, Pa.; Schmidt's "Problems of the Finishing Room," $5, Periodical Publishing Co., Grand Rapids, Mich.; Hopkins' "Scientific American Encyclopedia," $5, Munn & Co., New York; "Nineteen Ninety-Five Paint Questions Answered," $6, Painters Magazine, New York; Denning's "Polishes and Stains for Wood," $1.40, Charles Scribner's Sons, New York; Furnell's "Paints, Colors, Oils, and Varnishes," $1, Painters' Magazine, New York; Hurst's "Painters' Colors, Oils, and Varnishes," Painters' Magazine.

2. Loblolly pine (pinus taeda) is a yellow Southern pine known to the trade as North Carolina pine.

Books on Blue Print Reading.

360. Q.: Will you kindly give me the names and the publishers of a good book for one who wishes to learn blue print reading?—A. W.

A.: Blue Print Reading. Wyatt. $1. Bruce Pub. Co., Milwaukee, Wis.; How to Understand the Reading of Blue Print Drawings. Vigneau. $2. Educational Instructor, Detroit, Mich.; How to Read Blue Prints. Howard. $1.25. Chas. T. Powner Co., Chicago; How to Read a Workshop Drawing. Longland. $0.25. Spon & Chamberlain, N. Y.

Increase Accommodations. The Marshall high school, at Marshall, Mich., has occupied a new addition which houses the gymnasium, assembly room, household arts and manual arts rooms.

The sewing and art room will be on the upper floor and the cooking room will be on the lower floor, connected with the gymnasium so that it may be used advantageously in serving banquets. The household arts department has been given new quarters which are up-to-date in every respect.

The manual training department has been provided with entirely new quarters, including a large general shop for cabinet work and grade woodwork, a finishing room, a lumber storage room, and tool room. Power machines have been installed in the cabinet shop for use in wood working and additional machines such as a steel lathe and a forge are also planned.

In addition to the above, courses in drawing and design have been provided for the grades and high school, with a commercial course for the latter. The work is conducted under the direction of Mr. Edward John, Supervisor of Industrial Arts.

Better Work

Workshop of The Stout Institute, Menomonie, Wis.

THE STOUT INSTITUTE
Menomonie, Wis.

September 12, 1922

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IAM 5-23

NEWS AND NOTES.

Open Model Cottage. The Fairport High School at Fairport Harbor, O., has opened a model eight-room cottage for home economics classes. The instructors live in the home and 68 girls receive instruction in the home from time to time. The cottage was erected from plans of Miss Enid Lunn, state supervisor of home economics of Ohio.

Evening Schools Close. The evening vocational schools of Albany, N. Y., closed on March 16th after a most successful year's work, having served over 1200 men and women. An exhibit of the work of the classes was held in connection with the commencement exercises, at the Albany high school.

Printing Class. An evening class in printing was opened February 5th at the Boys' Vocational School, Albany, N. Y. The course continues until June first and has an enrollment of forty young men.

Vocational School. A new vocational school has been opened at St. Paul, Minn. The school seeks to prepare boys for entering the trades as advanced apprentices, who lack only the speed necessary to qualify as journeymen mechanics. One-half of the day is spent in shopwork and one-half in related subjects. There is no expense connected with the attendance of the students, except for tools used in the work which the student keeps when he goes into the commercial world. The building houses the trades of carpentry, cabinet making, machine shop practice and sheet metal work, printing, electricity, sign writing, watch repairing, jewelry repairing and automobile mechanics, brick laying and plastering. The school day begins at 9:00 A. M. and closes at 4:00 P. M.

Trade Analysis. The Division of Vocational Education of the University of California has prepared a bulletin on the Analysis of the House Carpenter's Trade. It contains an analysis of the trade with suggestions for the organization of teaching material and scientific methods of instruction. Administrators of trade and industrial schools, principals of high schools which give carpentry as a trade a place in their course of study, and instructors in the trade itself will find the bulletin useful in serving as a basis for the determination of the content of instruction.

Arts Association Meets. Three hundred delegates from schools in northeastern Pennsylvania were in attendance at the annual meeting of the Anthracite Arts Association held March 10th in the Liberty High School, at Bethlehem, Pa. Mr. James C. Tucker of Bethlehem, acted as chairman of the meeting. Prof. L. R. Drown of Lehigh University, spoke on the subject "Vocational or Cultural;" Mr. E. W. Barnhart of Washington, D. C., on "Vocational Commercial Education," and Mr. W. A. O'Leary of New Jersey, talked on "Education for Industry."

At the business session which immediately followed the luncheon, the following officers were elected: President, Miss Angela B. Blewitt, Scranton; Vice-President, James Martin, Dimmock; Secretary, Miss Nellie Cleary, Duryea.

Centralize Vocational Guidance. The centralization of all vocational guidance work in the public schools of New York City has been recommended by Mr. I. David Cohen, president of the New York Vocational Guidance Association. Mr. Cohen declares that at present the work is being done independently in all the schools and that it could be done more effectively if directed from a central office.

Vocational Courses. New courses in sewing and manual training have been introduced in the high school at Rich Hill, Mo. The high school has experienced a gain of 55 per cent in attendance in two years and has enrolled 152 in high school classes this year. About one-third of the enrollment is from the rural districts.

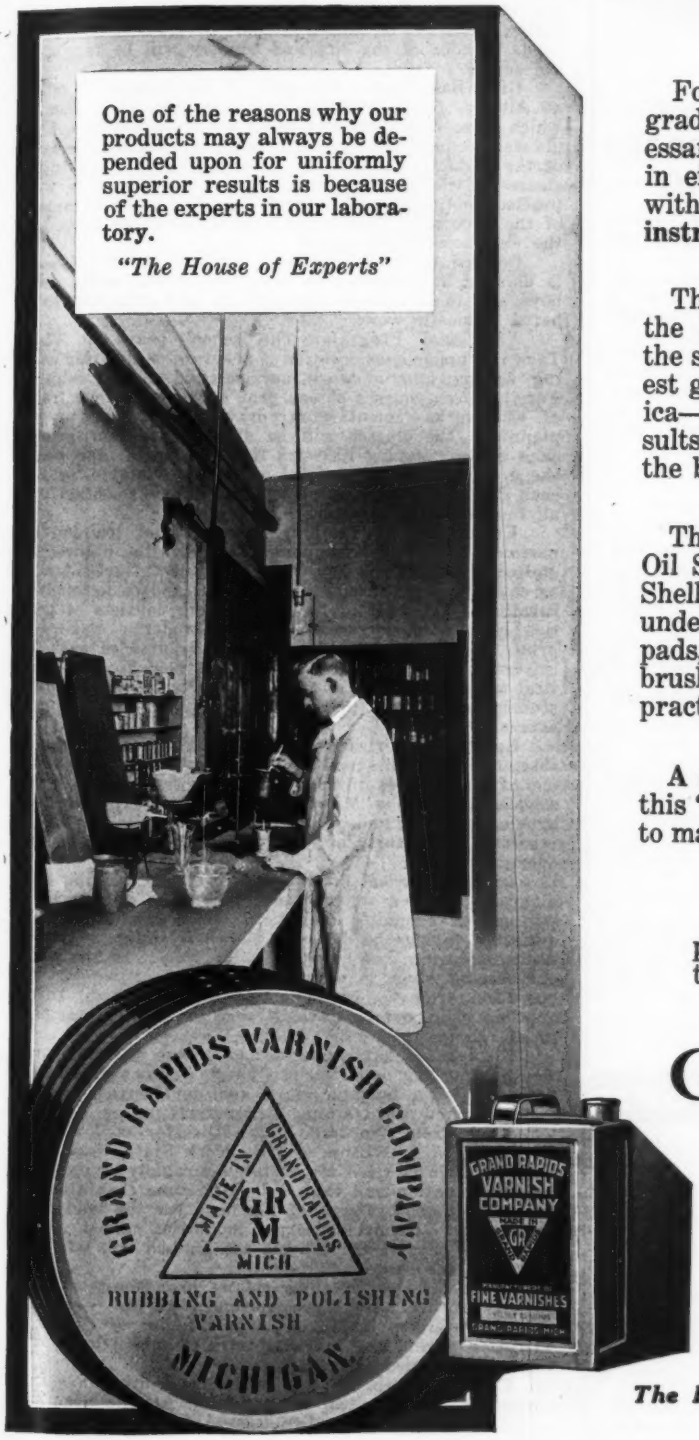
Build Equipment. Much of the manual training equipment for the new Bunker Junior High School, at Muskegon, Mich., was manufactured in the shops of the Hackley Manual Training School. The institution is an endowed manual training school presented to the city about 25 years ago.

Will Hold Dinner Conferences Dr. Wm. T. Bawden has called two conferences of shop teachers and supervisors to be held in connection with the Eastern and Western Arts Associations. Both conferences will be held in connection with evening dinners.

The convention of the Western Arts Association will take place April 30th at the Chase Hotel and will include discussions of the general topic "Standards of Eighth-Grade Attainment in Shopwork." The speakers will be

(Continued on Page XXVI)

A PRACTICAL
Wood Finishing Equipment
For Manual Training Schools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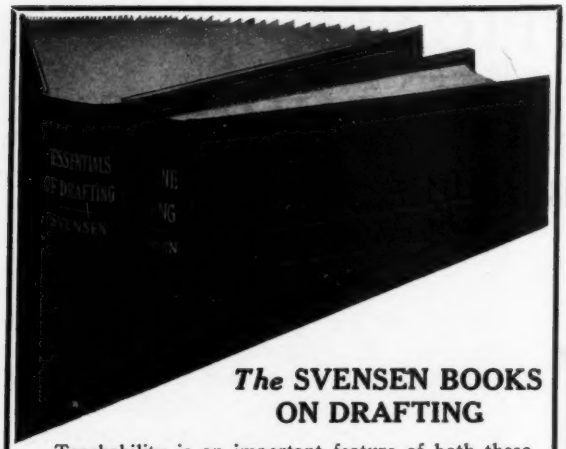

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Teachability is an important feature of both these books,—they are designed for teachers who appreciate vigor of presentation and accuracy of statement.

Each is an independent unit and may be used separately. Together they constitute a complete course, from the elements of Mechanical Drawing through Machine Drawing, a course notable for its thoroughness, clarity and simplicity. They were written after a survey of the needs of teachers generally and contain no localisms or peculiar methods. Rather are they designed for orthodox classes, and their wide use in High Schools, Trade and Technical Schools and University classes is indicative of their popularity.

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A class book on the fundamentals of Machine Drawing, planned to assist the student to an understanding of the relation of drawing to engineering.

An exceptional number of problems are presented by means of layouts and specifications, a feature the instructor will value, as they relieve him of the preliminary details which ordinarily arise in the assigning of Machine Drawing problems.

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(Continued from Page XXIV)

principal H. H. Ryan, St. Louis, professor Walter H. Miller, Columbia, Mo., supervisor Roy A. Michael, Kansas City and professor Robert W. Selvidge, Columbia, Mo.

The meeting of the Eastern Arts will take place May 2nd and the general topic will be "Means of Improvement for Teachers in Service." The speakers will include M. N. Stratton, Boston, William Noyes, Albany, N. Y., Arthur F. Hopper, Plainfield, N. J.

Vocational School. Provisions for the establishment of a vocational and manual training school at Canon City, Colo., are contained in the will of the late George F. Hook. The residue of the property is to be given to the Odd Fellows Lodge to be turned into the George F. Hook Trust fund. Trades of the city and country will be taught in the school.

Girls Bake Pies. The girls of the vocational school at Albany, N. Y., recently held a mince pie supper at which were displayed pies made by the students. Each pie was accompanied by a printed leaflet bearing the name of the maker. The leaflets were printed in the printing classes of the Boys' Vocational School. The girls were praised for the manner in which they had taken advantage of the opportunity to learn practical things as proved by the excellence of the pies.

Colored Industrial School. A colored industrial school is planned at Summerville, Ga. The school would teach boys how to farm more scientifically and girls how to do better domestic work.

Vocational Program. The school board at Cisco, Tex., has under consideration a program calling for cooking, sewing, laundry work, nursing, and related subjects. For the boys, courses of one year each in the four trades of woodwork, cement work, drawing and printing are planned. The classes will be divided into four groups, each group pursuing its work for a period of nine weeks, the groups at the end of the time being rotated, so that each group has the opportunity of coming in contact with all four trades during the school year.

Useful Manual Training. The manual training department has filled an important place in the high school at Rochelle, Ill. The boys have made useful articles such as chairs, writing desks, library tables and other kinds of furniture. One-half of the year's work consists of practice in mechanical drawing. The students make blue prints from which they construct the articles made in the classes. In the shop, the aim has been to offer practical mechanical work of such a character as will help the student in his work in the shop or in pursuing a college course.

Speed Tests in Motor Assembling. A speed test in assembling and dissembling various types of motors was one of the features of the program of the vocational high school, Minneapolis, Minn., on March 2nd. The electrical group took down and rebuilt storage batteries, tested and repaired generators, and showed how ignition systems operate.

In the electrical department, students working from diagrams, showed the mysteries of signal wiring, house wiring and conduit installation. How current is made available during the day was shown by a group of students operating every motor in the shop. In the steam engineering shop, a complete power plant was in full operation, from the coal pile to the switchboard. In the printing shop, demonstrations were given in typesetting, proof reading and press feeding.

Displays of hats, dresses and gowns were shown in the dressmaking department. There was a nursing room fitted up as a hospital ward and demonstrations were given to show the training of practical nurses.

Must Train Workers. State Director of Vocational Education L. A. Wilson, of New York State, in a recent address, declared the United States is rapidly becoming an industrial nation and that it is high time that attention be given to the training of the boys for the trades and occupations. He held that our industries cannot survive unless the boys in the schools are trained and later employed in the shops and factories.

Trade Classes. Evening classes in masonry, painting and decorating have been continued at the Vocational School, Paterson, N. J. A large number of classes in operation during the previous term of school have since been discontinued.

Printing Class. A new class in printing has been opened at the Technical High School, Atlanta, Ga. The

(Continued on Page XXVIII)

Building habits of clear thinking
—with school art
art stimulates self-expression
What art education means to your child

What five Saturday Evening Post messages have done for School Art

HERE are reproduced in miniature a series of five American Crayon Company school art messages which have appeared in The Saturday Evening Post during the last few months.

Reaching many millions of American Parents, these messages have served to create a better public understanding of the vital purpose of school art.

A growing appreciation of the practical value of this subject is evidenced by the many letters this company has received *from parents in every section of the United States*, following the appearance of each message.

These letters show more than a newly awakened interest. They show a desire to co-operate with the schools in advancing a subject which is so important to the child's development.

This growing spirit of co-operation is of untold value to school art, and should lend a decided impetus to its growth.

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Sledge-Tested VISES

Here is the swivel type forged steel leg vise. It gives a far greater range of work than in ordinary vises of this general type.

Every type of wood working or metal working vise is included in the Columbian line. Being specially designed, they give you many exclusive features which add to their ease of operation, strength and general adaptability. Send for our latest catalog showing every type of vise for manual training requirements.

The Columbian Hardware Company

World's Largest Makers of Vises and Anvils

CLEVELAND

(Continued from Page XXVI)

course is intended for boys with a grammer school education, who desire to learn the trade as a life vocation. The course requires that three hours be given to shopwork and three to related subjects in the academic classes. The course covers a period of two years.

Shoe Repairing Classes. Fully ninety per cent of the former service men enrolled at the Washburne Continuation School, Chicago, in the shoe making and repairing classes, have opened shops of their own. During the past two years, more than two hundred men have left the school to go into business for themselves. The course covers two years but especially apt pupils often learn the work in eighteen months.

Decorative Art Cover. The spring number of "The Tattler," issued by the McKinley Alternating School, at Newark, N. J., contains a particularly attractive cover in gray and blue tones. The spot of color which attracts and holds the interest is a shallow, blue dish filled with early spring flowers in bright yellows, lavender and red. A lamp in lavender, with a soft tan shade, completes the picture. The design is printed on a good grade of homespun cover stock. The cover is an interesting example of linoleum block printing produced in the art classes of a public school.

Trade Talks to Further Art in Industry. The Association of Arts and Industries of Chicago has taken steps toward the establishment of the first industrial art school in the middle west, in which all crafts will be represented. This school will be held in connection with the Art Institute of Chicago.

In this direction, the association has outlined a program which consists in holding exhibits of various industries, either at the Art Institute, or in the leading stores. Weekly trade talks are given by different speakers, each one taking up a craft in succession. For example, during March talks were given on textiles and furniture by men fitted to handle these important subjects. Similarly, in April, talks were given on the subjects of printing papers and the art of making alarm clocks. In every possible way the association is seeking to emphasize the importance and the economic value of good design in American made products.

Training Foremen. The State Board of Vocational Education of Virginia has inaugurated a plan for training foremen for the trades and industries. Several of the large coal companies and the state vocational department have cooperated in conducting so-called "courses for the improvement of foremanship."

At first, the employers were reluctant to cooperate, feeling that theory alone would not be a valuable asset to them in developing a vocational program. However, before the course was completed both the foremen and employers were enthusiastic about the work. The plan has been a very great success in the shops and has won the entire approval of the employers.

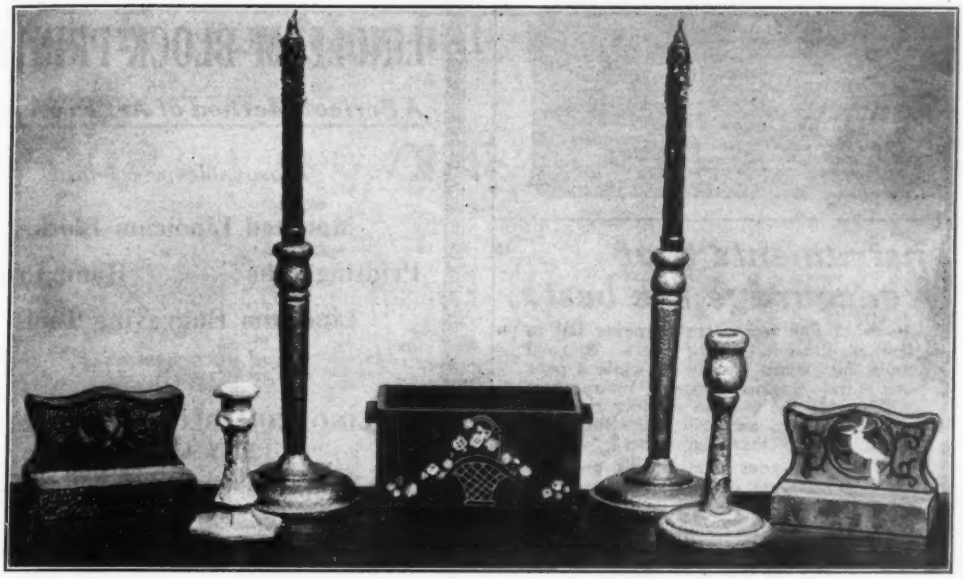
New Printing Class. The high school at Somerset, Kentucky, was the first in the state to introduce the teaching of printing. The printing classes get out the school paper, the school annual, the school paper of a neighboring town, produce the superintendent's annual report, and take care of all the printed matter required by the schools. It is believed the department more than pays for itself through the value of the work turned out.

—**North Adams, Mass.** The courses in the Drury High School have been reorganized. Practical arts has been given added emphasis, household arts has been introduced, and a differentiated commercial course for girls has been provided.

School of Automotive Engineering. An interesting form of vocational education is that being conducted by the Oregon State Board in automotive engineering at Salem. The school is located in rooms rented for the purpose in the rear of a garage and was opened in charge of Mr. H. J. Milsom and Mr. Lee U. Eyerly. Day classes are conducted from eight to five each day and evening classes from seven to nine.

In addition to the usual instruction offered, the school provides outside lectures and demonstrations. On a recent occasion, Captain Eddie Rickenbacker, the famous American "ace" of the flying field, now famous as a car designer, was secured for a lecture. Illustrated lectures by representatives of automobile companies have also been given and a recent lecture on the composition of oils used in the industry proved interesting to the students.

(Continued on Page XXXI)



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Jesso decoration is the revival of an ancient European art, and is now being widely used to secure colored relief decorations. Bradley Jesso is supplied in 2-oz. jars, ready to use, in the following colors: Rose, Scarlet, Tangerine, Melon, Mineral Green, Robin's Egg Blue, Cadet Blue, Green, Slate and Black.

Price, 25 cents.

JESSO MODELING FOR MODERN HANDICRAFT
By LOUISE D. TESSIN

A little masterpiece of book making which tells by text and shows by illustrations and designs how to obtain maximum results in Gesso Modeling.

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BRADLEY'S ART ENAMEL
Air-Drying 15 Colors Waterproof

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Price, 30 cents.

BRADLEY'S TONAL TEMPERA

A superior grade of poster and show card colors especialy adapted for design and decorative painting where opacity is essential. Made in twenty-seven colors.

Price, 25 cents.

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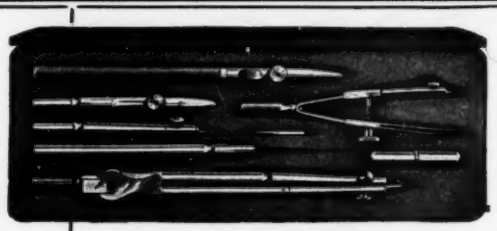

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Tools of fine workmanship never fail to lend inspiration to their users. A good knife cuts sharp and clean, while a poor one tears. Cosmos Drawing Instruments will enable the user to produce the best that is in him, and will make the work much more pleasant for him.

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We furnish plans, blueprints, motors, tone arms, case material,—in fact, everything required, including, full instructions. Choraleon Phonographs are unsurpassed in tone. They play any record.

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523 6th St.
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The appearance of many a drawing is marred by poor lettering. But there is not always time for the slow and tedious work of carefully forming letters with an ordinary lettering-pen.

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Large Ink Capacity: From 50 to 100 letters with one filling of the pen.

Pens for very fine work have aluminum handle and cork grip. Those for heavy lettering black wooden handles.

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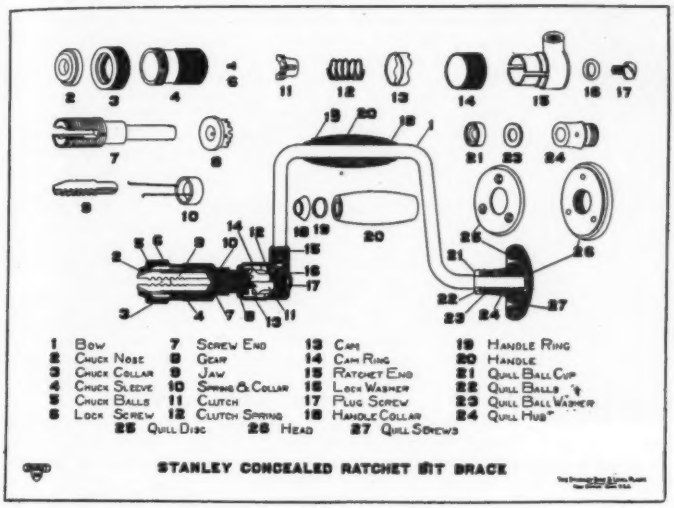
FREE to Manual Training Teachers



to help in explaining the names by which the parts of Tools are known to the craft. This illustration of the Ratchet Bit Brace shows the completeness and accuracy with which these Charts have been prepared.

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STANLEY TOOLS

(Continued from Page XXVIII)

The latest course to be offered is one in grooming and driving cars for car-owners. The work gives an insight into the mechanism with which persons driving cars should be familiar. The actual training given is thorough and students steadily pass from the school into remunerative employment in the automobile business. The school is at present being conducted under the direction of Mr. Eyerly, Mr. Milsom having moved to Portland.

The vocational service for juniors in New York City gave a comprehensive account of its work recently to the associated local school boards of Manhattan through Mrs. Alice K. Politzer, director. Last year a total of 7,616 jobs were found for pupils through the service, including office work, mercantile, trades, factory jobs, skilled trades, part time, errands and miscellaneous.

A professional improvement course in art will be offered by the Potsdam (N. Y.) state normal school beginning with July 2nd and continuing until August 11th. The course will be in charge of Leon L. Wilson of the New York state department of education.

"Ninety-five per cent of the beggars on the streets could be made self-supporting," declared W. F. Faulkes, superintendent of the Wisconsin state board of vocational training recently.

At Tennessee Polytechnic Institute the Cabinet Making Department has recently completed the construction of 18 teachers' desks. The desks were made for the Cookeville City Board of Education, and are being used at the city public schools. They were made at a cost of $180 and are valued at $450. The work is under the direction of Prof. S. Lewis Land.

Pratt Alumni Dinner. The 19th annual dinner of the Alumni of the Woodworking Department of Pratt Institute took place March 24th at Yates'. The toastmaster was Mr. R. M. Van Gaasbeek, Director of the Department of Woodworking. Addresses were made by educational, labor and industrial leaders of New York state.

Change Name. By a recent act of the Kansas legislature, the name of the Manual Training Normal School, at Pittsburg, Kansas, has been changed to the Kansas State Teachers' College. The normal school was established primarily for the training of manual training and home economics teachers but for many years this school has offered college work for the training of elementary and high school teachers.

The Kansas State Teachers' College is one of the few institutions offering a four-year course in industrial arts. It has attained a high reputation for efficiency in preparing teachers for the field of industrial education and is very anxious that the change in name shall not give the impression that the emphasis is to be lessened in this field. It will be the policy of the school to increase, rather than decrease, the efficiency of the work in this department.

Vocational Guidance. A series of lectures for vocational guidance day was delivered at the University of Kentucky on March 20th. Among the topics considered at the lectures were Widening Opportunities for Women, Women in Science, Library Work, Vocations for Women, Teaching, Women in Art, and Music.

Trade School Work Enlarged. Indiana has been able to enlarge the scope of its vocational work through legislation requiring the state to pay only one-third of the instruction costs. Formerly, the state's share was one-half of the cost, and as a result, the state has been short in its annual vocational fund.

Vocational School. The city council at Green Bay, Wis., has approved the plans for the proposed vocational school but the building will not be erected until 1924 when funds will be available. The building will be of the factory type and will be three stories high.

Annex Opened. The new annex of the Elm Vocational School, at Buffalo, N. Y., was opened on March 7th, in connection with the twelfth annual "open house and exhibition night." The new building takes care of four departments, namely, the tire vulcanizing department, starting, lighting and ignition work, and the storage battery department. The school seeks to furnish pre-employment industrial education to boys who desire to become skilled journeymen mechanics.

Brick-Making Course. Under the auspices of the local clay club, an association of brick and tile manufactures, the schools of Columbus, O., plan to inaugurate a course in brick and tile making. The course is intended for those who expect to enter the trade, and for those in the schools who may desire to pursue the work in connection with the regular school subjects.

It pays to keep posted on new Starrett Tools

THE announcement of the new Starrett Stainless Steel Rules marks another definite advance in better shop practice. These rules—made from the highest grade of stainless steel—will not rust or stain—an improvement whose value is immediately apparent to every precision tool user. In addition the Starrett Stainless Rule is **hardened** and **tempered,** giving a rule good for a lifetime's accurate service.

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Write for Catalog No. 22 "CE" and the Supplement describing the new Starrett Tools.

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Vocational Program. The school authorities of Coffeyville, Kans., are planning the inauguration of an extensive vocational program. Mr. Harry McGinnis, vocational director, is seeking trained men to take charge of special types of vocational work under the new program.

New Machine Shop. The machine shop in the new Roosevelt High School, at Kent, O., has been fully equipped for immediate use. The course is offered under the provisions of the Smith-Hughes law and is of a general industrial character. The local manufacturing concerns have cooperated with the board in the equipment of the shop. At least two-fifths of the cost of equipment has been borne by the Lampson-Sessions Company, the Mason Tire and Rubber Co., the Kent Machine Co., and the Erie Railroad. A special vocational advisory committee has been formed to offer assistance in working out the proper type of training to be given in the vocational courses.

Rodney Brace has resigned his position as principal of the C. M. Schwab Industrial School, Homestead, Pa., to accept an appointment to the charge of St. Thomas Church, Cannonsburg, Pa., from Bishop Alexander Mann. Mr. Brace is to enter the Episcopal Ministry.

Industrial Arts Department. The new industrial arts department of the high school, Millinocket, Me., will include a machine shop, a print shop and a general industrial room. The department is one of the largest and most expensively equipped in the state of Maine.

PERSONAL NEWS.

Mr. R. M. Van Gaasbeek, head of the department of wood working of Pratt Institute, Brooklyn, N. Y., has been appointed a member of the faculty of the Summer Normal School at Oswego, N. Y.

S. C. Sonnichsen was appointed state director of vocational education by May Francis, state superintendent of Iowa. The appointment was approved by the vocational board.

Mr. Paul Best of DeKalb, Ill., has accepted a position as instructor of printing in the high school at Saginaw, Mich.

State Supt. Charles A. Lee of Missouri has been appointed as executive officer of the Department of Vocational and Industrial Rehabilitation of the state.

Mr. C. C. Williams is completing his third year as instructor in the industrial arts department at Cleburne, Tex. Mr. Williams is a graduate of the State Teachers' College, Pittsburg, Kansas.

Mr. Ellsworth Gilbert, a graduate of the State Teachers' College, at Pittsburg, Kans., is filling the position of director of industrial arts at Arma.

EASTERN ARTS MEETING.

Chairman E. A. Reuther of the program committee has announced the preliminary program for the fourteenth annual convention of the Eastern Arts Association to be held May 2, 3, 4 and 5, at Providence, R. I.

The headquarters of the association will be in the Providence Biltmore, where registration booths will be maintained on the opening day of the meeting. The convention hall and exhibits will be housed in the Rhode Island State Armory.

The association has obtained a special reduced fare for the return trip for the benefit of members. This is contingent on an attendance of not less than 250 members and the presentation of the proper certificate duly validated by the railroad ticket office. Members are especially urged to deposit their certificates in order that those coming from long distances may obtain the benefit of the special reduced fare.

The Program.

Wednesday, May 2nd.

Topic: Means of Improvement for Teachers in Service. Chairman, Dr. Wm. T. Bawden, U. S. Bureau of Education.

Thursday, May 3rd.

"Historic Providence," Col. H. Anthony Dyer.

"The Graphic Sketch Club," Mr. Samuel Fleisher, Philadelphia, Pa.

"Clarifying the Objectives of Individual Arts," Dr. David Snedden, Teachers College, Columbia University, New York.

"Applied Dynamic Symmetry, Mr. Edwin A. Hoadley, Lowell Normal School, Lowell, Mass.

"Training the Teacher in Art," Waldo F. Bates, Normal School, Peterboro, Pa.

"The New York Plan of Art Education," Esther Bensley, Normal School, Cortland, N. Y.

"The Boston Plan of Art Education," Theodore M. Dillaway, Director of Manual Arts, Boston, Mass.

"Shop Work Below the Junior High School," Edward C. Emerson, Director of Manual Arts, Boston, Mass.

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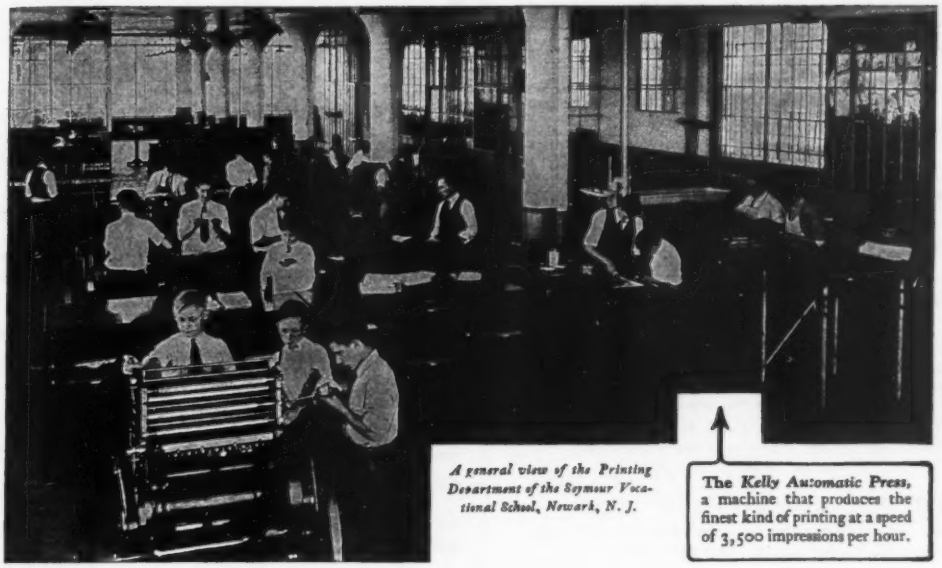

A general view of the Printing Department of the Seymour Vocational School, Newark, N. J.

The *Kelly Automatic Press*, a machine that produces the finest kind of printing at a speed of 3,500 impressions per hour.

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For teachers and supervisors of Household Arts, for dietitians and for institutional directors.

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(Continued from Page XXXII)

"Cooperative Course in Technical High School," Frederic W. Putnam, Director of Industrial Education and Drawing, Providence, R. I.

"The Use of Intelligence and Accomplishment Tests in Directing Pupils into Practical Arts Courses in Junior and Senior High schools," Richard D. Allen, Director of Research and Guidance, Providence, R. I.

"New Conceptions of Home Economics Education," Miss Frances Zuill, Supervisor of Home Economics Education, Baltimore, Md.

"Courses in Home making for the Grade School," Miss Blanche I. Haddow, Home Cooking Department, New York, N. Y.

"Training for High School Students in House Furnishing," Miss Martha Van Rensselaer, Cornell University, Ithaca, N. Y.

"The Functions of the Academic and the Special Teacher in Shop Work for the Continuation School Boy," Mr. M. Norcross Stratton, Agent for Teacher Training and Supervision, Massachusetts Department of Education.

"The Functions of the Academic and the Special Teacher in Commercial Work for the Continuation School Pupil." Mr. Paul S. Lomax, Director of Business Education, Trenton, N. J.

"The Prospect for Continuation Schools," Mr. I. S. Noall, Agent for Part-Time Education, Federal Board for Vocational Education, Washington, D. C.

"Present Problems of Vocational Education," Mr. Arthur F. Payne, Head of Department of Industrial Education, University of Minnesota.

"The Building Trades Department of the Connecticut State Trade School," Mr. Frederick J. Trinder, State Director of Vocational Education for Connecticut.

"Vocational Education in Massachusetts," Mr. George A. Burridge, Director of Vocational School, Springfield, Mass.

"Industrial Relations as Affected by Educational Activities," Mr. M. J. Kane, Personnell Manager, West Lynn Works of the General Electric Company.

Friday, May 4.

"Address," Dr. Walter E. Ranger, State Commissioner of Education for Rhode Island.

"A Modern Program in Art Education," Mr. Walter Sargent, Professor of Art Education, University of Chicago.

"Extension Work for a Progressive Association," Mr. Royal B. Farnum, Normal Arts School, Boston, Mass.

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Saturday, May 5.

"Address," Dr. Frederick B. Robinson, Dean of School of Business, College of the City of New York.
Report of special committees.
Election of Officers.

PROGRAM OF WESTERN ARTS ASSOCIATION.

The chairman of the program committee has announced the following program for the forthcoming convention of the Western Arts Association to be held May 1, 2, 3, and 4, at St. Louis, Mo.

Monday, April 30.

Conference of shop teachers and Supervisors: Dr. Wm. T. Bawden, Chairman.
"Topic:" Standard of Eighth-Grade Attainment in Shopwork.

Tuesday, May 1.

"Better Home Building and Planning," Mr. Ross Crane.

Wednesday, May 2.

"Educational Values in the Industrial Arts," Leon L. Winslow, specialist in art and industrial arts education, state education department, Albany, N. Y.
"What the Schools Can Do Which Will be Advantageous to the Printing Industry," Wm. Guy Martin, Managing director of the Ben Franklin Club.
"The Creative Impulse," Mr. Raymond P. Ensigh, Dean of the Chicago Art Institute.

Thursday, May 3.

"Address." Miss Mary E. Sweeney, executive secretary of the American Home Economics Association.
"Address," Mr. Valentine Kirby, state director of art for the state of Pennsylvania.

Friday, May 4.

"Our Renaissance in Home-Making," Mrs. Frances V. Ward, director of home economics at Washington University.
"Address," Miss Mary Powell, director of art libraries, St. Louis Public Libraries.
"Address," Mr. E. H. Wuerpel, director of the St. Louis School of Fine Arts.
"The Problem of the Relation of Industries and Fine Arts to the Modern Program of Education," Mr. Chas. S. Meek, Superintendent of Schools, Toledo, O.

Other well-known speakers in the field of manual arts to appear on the program are Prof. S. J. Vaughn, Prof. I. S. Griffith, Charles A. Bennett, R. W. Selvidge, Miss Florence Williams, Miss Gertrude Cary, Miss Louise Stanley, Miss Clara E. White, Miss Florence H. Fitch, Mr. Imes of the Century Electric Company, and Pres. E. L. Hendricks of the Warrensburg State Teachers' College.

Arrangements have been made to secure a fare-and-half rate for St. Louis and information concerning the lines and the necessary certificates will be available from Secretary L. R. Abbott, Grand Rapids, Mich.

A VOCATIONAL PROJECT—A SHORT UNIT SALESMANSHIP COURSE.

The Department of Vocational Education of the Indianapolis, Indiana, Schools, with the cooperation of the local chamber of commerce, in February, completed arrangements for a short unit salesmanship course. The course, which ran from February 26th to and including March 2nd, covered five consecutive installments and emphasized particularly those problems connected with the selling of hosiery. The classes, which were held in the chamber of commerce rooms, were attended by sales people from the hosiery departments of a number of the leading department stores, shoe and men's furnishings establishments of the city. Among the topics taken up at these classes were The Importance of Salesmanship; The History of Hosiery Manufacturing; Talking Points in Making a Sale; Successful Salesmanship in a Modern Department Store (a dramatic sketch of the methods of a typical store); Methods of Handling Different Types of Customers, together with actual demonstrations of correct selling by a representative of one of the large hosiery manufacturers.

The instruction was given by several teachers of salesmanship in the vocational department. One of the interesting features of the week was the dramatic sketch given by the members of the salesmanship class of the H. P. Wasson Company, showing some of the types of sales people and customers encountered in a hosiery department. An expert from the Burson Hosiery Mill conducted one lecture in which he presented information required for a sales person to become acquainted with the details connected with the selling of high grade hosiery. Miss Helen Haynes conducted the class.

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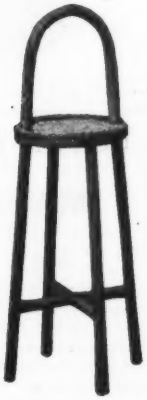

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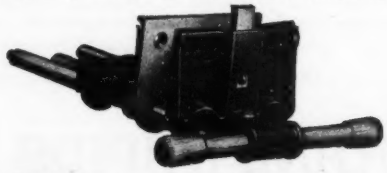

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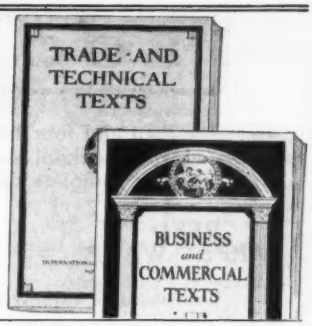

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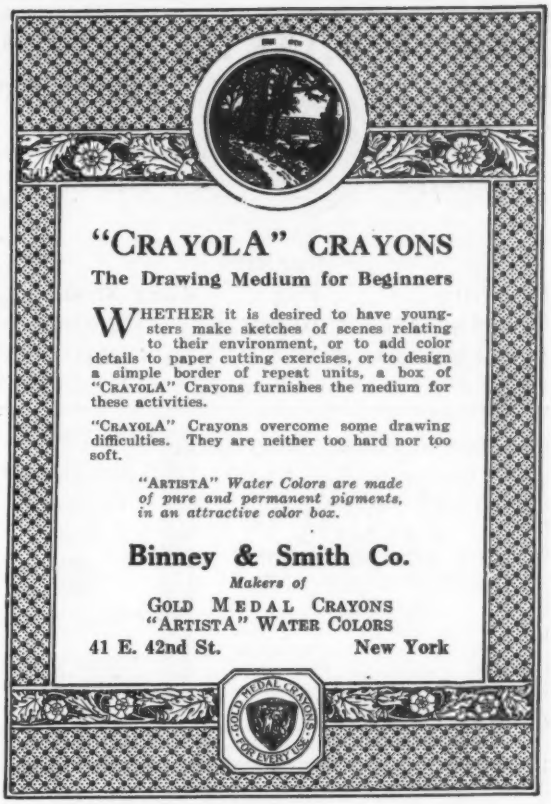
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BUYERS' NEWS.

New Blue Printing Machine. A new blue printing drier has just been brought out by C. F. Pease Company, Chicago. The drier is adaptable for drying blue prints, negative prints and all kinds of photographic prints. The wet paper is placed on an endless canvas belt and is drawn around the heating cylinder and dropped on the opposite side perfectly dry and free from wrinkles.

The machine is equipped with a copper cylinder which retains the heat and prevents the prints from adhering. The machine may be started a minute after the gas is lit and operated at a rate of eight to nine feet a minute. This quick stop is possible because of the arrangement of a squeegy roller and also because the traveling apron is declined downward allowing the surplus water to drip into a tray.

The machine is equipped with a patented thermostatic control which insures even temperature of the cylinder and prevents both over and under heating and consequent wrinkling or scratching of prints. The thermostat is supplied with an electric heating medium which is applied to the machine where gas is not available. On the electrically operated machine a series of switches is provided to enable the operator to properly adjust the temperature when the machine is started. In practice this has been found to supply absolute uniformity.

The machine is fitted with an asbestos apron which is run around the cylinder when the machine is stopped. Its purpose is to prevent the rotting of the endless canvas band.

The machine is arranged for 42-inch paper and is provided with two ranges of speed for light and heavy papers.

Complete information may be had from the C. F. Pease Co., 802 N. Franklin St., Chicago, Ill.

Vise Pamphlet. The Charles Parker Company, manufacturers of Parker Vises. have issued a leaflet of interest to all users of vises. The cut is in "phantom" bringing out the details of contruction of the Parker Vises in an interesting manner. Copies will be sent to supervisors and teachers on request.

Simonds Guide for Carpenters.—A 62 page vest pocket size booklet is being distributed by Simonds Saw and Steel Co., "The Saw Makers," of Fitchburg, Mass. The booklet is full of information for carpenters, some of it technical about rafters and their cuts, instructions for filing saws, and about rise and run of stair building. Other items are of general interest: number of nails per pound, lumber table, wood measure, estimates of material, etc. The booklet will be mailed on request.

New Oliver Catalog. The Oliver Machinery Company has just issued a new bulletin in which are presented portable woodworking machinery. The Oliver line now includes a saw bench, a band saw, a planer and jointer, a disk sander, a spindle sander, a wood trimmer and several grinders all of the portable type. Copies of the catalog may be had by requesting bulletin No. 7.

New Saw.—The Oliver Machinery Company has added to its line of portable woodworking machinery a new band saw, No. 192. The saw is motor driven and fully safeguarded. Circulars are available.

REPORT OF THE SPRING MEETING OF THE INDUSTRIAL ARTS SECTION OF THE WESTERN PENNSYLVANIA EDUCATIONAL ASSOCIATION.

The Industrial Arts Section of the Western Pennsylvania Educational Association met at 9:30 A. M., Saturday, March 24th, in Room 109, Schenley High School, Pittsburgh, Pa.

The meeting was well attended, seventy-four members being present.

The speakers of the day were very interesting and brought real up-to-the-minute messages.

Dr. Frank M. Leavitt, Associate Superintendent of the Pittsburgh Public Schools, explained the progress of Industrial Education in Pittsburgh.

The Assistant Director of Vocational Education of the Pennsylvania Department of Public Instruction, discussed "Outstanding Features of Practical Arts and Industrial Education."

Mr. J. C. Wright, Director of the Federal Board for Vocational Education, spoke on "A Complete Program in Education."

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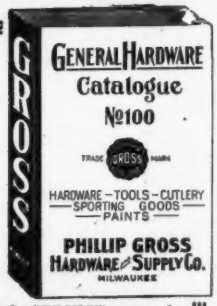

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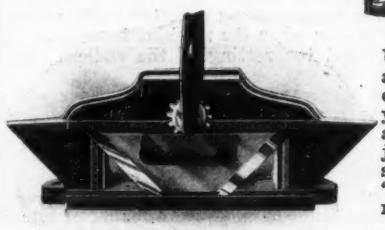

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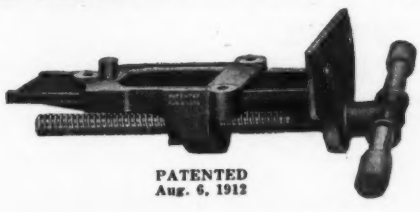

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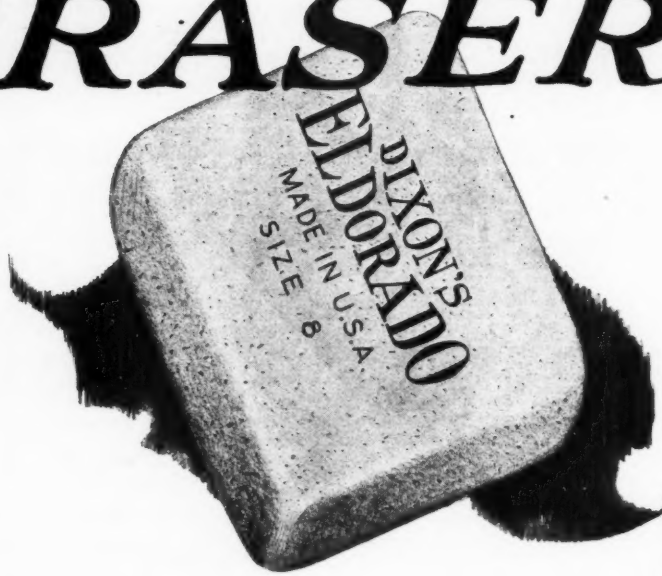

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VIEWS OF THE CENTRAL HIGH SCHOOL
WASHINGTON, D. C.

[NOTE—Mr. Clark had the two photographs taken of his "practical shop," as he terms it, in which high-speed production is maintained. Mr. Clark is of the old school, having been trained in all branches of the printing arts. Besides typography, he imparts to the students his knowledge of advertising, bookbinding and presswork, dwelling particularly upon color work, "which takes the dryness out of the work and makes it less monotonous." Besides having a wide mechanical knowledge, Mr. Clark has teaching ability, which accounts very largely for the success of his department.]

The Instructor of Printing in Central High School, Washington, D. C., MR. W. FRANK CLARK, ***writes about the interest the study of Printing has created in the school, emphasising the educational value which the printed matter produced by the students in the Printing Department has had upon the entire school of 3400 students:***

Our printing equipment is up-to-date and large enough to supply the school with the printing it needs. We have two Chandler & Price presses, the larger one with long fountain and vibrator; a wire stitcher, a 26-inch C. & P. paper cutter (enclosed belt), three imposing stones, ink cabinet, twelve type cabinets and a cylinder press. There is an ample supply of type, rules, leads and slugs, and miscellaneous materials. To my mind it is a finely equipped shop which Barnhart Brothers & Spindler installed for us. The thing we are much in need of is more room, but we manage to get along fairly well, even though somewhat crowded.

We are enabled with this plant to print everything needed for Central High School, and in addition some for other schools.

Each week we print 2900 four-page papers, 19x24, and monthly 2500 copies of "The Review," Central High School's 48-page magazine, with cover, the size of which is 9x12 inches, done in two colors. Then there is a large quantity of miscellaneous job work constantly called for, which is handled by the students in a most efficient manner.

We have forty-four students, an average of eleven to a class who are always interested in their work, so intent on what they are doing that the closing bell very often is not heard by them. Their ages range from twelve to eighteen. I have found the younger students more apt in learning the technical operations, because they apply themselves better to the study, probably due to the fact that they have fewer attractions to keep them out late at night.

On the whole I have a fine lot of young people in whom I take a great interest. Some of them I place with advertising concerns, while others find their way into commercial print shops, after they are through with their school studies.

Every community should have printing taught in school; in fact, every school should have a well-equipped printing plant. There is more interest created in a general way in the school because of this study than can be secured by any other method.

Take our monthly magazine, for example. There is a well-organized staff of students who write for and manage this paper. There is an editor-in-chief and three assistants, seventeen department editors, a business staff, consisting of a manager and assistant, advertising manager and assistant, and a cashier and bookkeeper. We also have ten semester reporters and four floor managers.

Our magazine carries twelve pages of advertisements, which, of course, is a source of income and enables us to print it.

Contributions to our magazine come not only from the staff members, but from other students as well, providing a fine training in journalism, and with each succeeding issue there is created an inspiration which calls for greater effort on the part of the writers to submit the best thoughts for publication in the journal which is all their own.

Of course, the print shop plays an important part in this school activity—it makes it possible for Central High School to have its own magazine.

Educational Department
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Barnhart Brothers & Spindler

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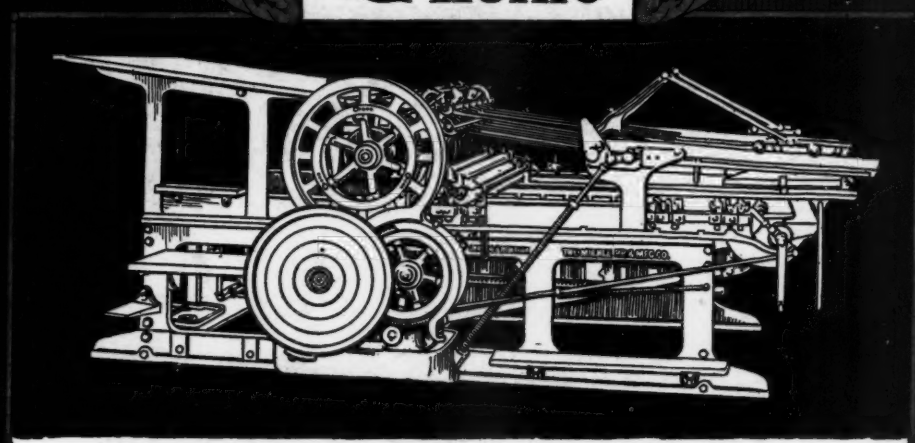

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